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CENSUS STATISTICS AND LOCAL AREA ANALYSIS IN URBAN AND REGIONAL PLANNING

UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

ABSTRACT

The purposes of this study are two-fold:

1) To identify and document gaps or differences between the products and services of the (federal) Census of Population and Housing, and the data needs, data applications, and research instruments of planners in the conduct of research and analysis; and

2) To specify (as recommendations) prospective means to narrow or bridge those gaps or differences.

To achieve this end, discussions are presented comparing the preferred situation (derived from an intensive search of the open literature) against the existing situation (derived from survey research findings including those personally acquired via questionnaire-interviews with local planners, plus findings from recent survey efforts of others).

Comparison of the existing versus the preferred situation revealed many gaps between the (Census) data products and services provided by Statistics Canada, in relation to the data needs of local planners. Other differences were identified regarding the preparation for, and application of, data products and services by planners. Gaps and differences in this regard involve considerations related to the temporal, spatial, financial, technical, subject matter, and philosophical aspects of data base development and application activities.

In terms of resolution of the gaps and differences, both Statistics Canada and local governments have important contributions to make. It is at the local level in particular, however, where gaps and differences are most likely to be overcome by the adoption of such self-help initiatives as the following:

1) The pursuit of corporate/strategic planning initiatives;
2) The development or expansion of computer-assisted information system capabilities; and
3) The integration of information services (intra-agency and/or regional).

In conclusion, a more extensive, nation-wide study is required before attempting to respond, at the federal level, to data needs in general. In this regard it is recommended that the Canadian Institute of Planners participate in such investigation.

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ACKNOWLEDGEMENTS

This research effort is dedicated to Louise and Jaclyn who have endured without my time, attention and presence which they so richly deserve. Special thanks are extended to Dr. Barry S. Wellar, University of Ottawa, for his guidance, supervision and perseverance in seeing me through this process. Further thanks are extended to Ross Bradley, Statistics Canada, for providing access to resources and opportunities.

"No City Ever Became Great
By Chance"

Seneca.

PART I: NATURE OF THE INQUIRY

1.0. INTRODUCTION

In general terms, this research is concerned with analytical methods for local government urban and regional planning, and associated data base development considerations and requirements. More specifically, the inquiry is concerned with:

1. The existing and prospective contribution that Statistics Canada -- with the data base generated from the Census of Population and Housing -- can provide as a supplier of both 'products' and 'services' to facilitate the local government planning function; and
2. Planning-related data base development and application activities with an emphasis on current and prospective means for establishing computer-assisted methods as aids to local area analysis.

For the purpose of this thesis, local area analysis is meant to refer to methods and techniques of analysis for application by local government agencies (urban and regional) and specifically excludes analysis conducted at a provincial or national geographic scale of inquiry.

The underlying assumptions leading to development of the research topic pertained to envisioned gaps/differences between the utility of current federal census products and services provided by Statistics Canada, and the current and impending data needs, data uses, and research instruments of local government planners. The primary objectives, therefore, are to identify and document the extent of the gaps/differences, to consider the implications for

local area analysis should they continue, and to determine, where possible, ways and means whereby the gaps/differences between the primary supplier of census statistics (Statistics Canada) and the users of census statistics for local area analysis in urban and regional planning can be narrowed in some cases and bridged in others. In so doing, considerations are devoted to the data base development and applications activities of relevance to local government planning initiatives.

Research of any nature is, unquestionably, more appropriately accomplished if done within a suitable framework, is based on solid methodology, and is consistent with the underlying philosophies of forecasting and research methods. Since the primary objectives involve determining, where possible, future directions for both the supplier and users of federal census statistics (products and services), the philosophical approach employed is based upon the Kantian inquiry system.

As discussed by Mitroff and Turoff (1973), the Kantian inquiry system postulates that data and theory are inseparable; meaning that research should not be based upon the collection of raw data independent of theory, or vice-versa. An important feature of the Kantian inquiry system specifies that for any problem ".... one must build at least two alternate representations or models.... to get as many perspectives as possible on the nature of the subject problem."[1]

For this study, an attempt is therefore made to develop both theoretical and data components. To substitute for the lack of a 'theory of planning', many literary sources are consulted and referenced. Direct observation data, on the other hand, include both primary data obtained by means of questionnaires/interviews, and secondary data obtained by other researchers during their empirical inquiries.

The framework applied in pursuit of the research objectives is displayed in Figure 1, and consists of four primary research components:

Part II - presents the general context and problem definition via brief discussions of:

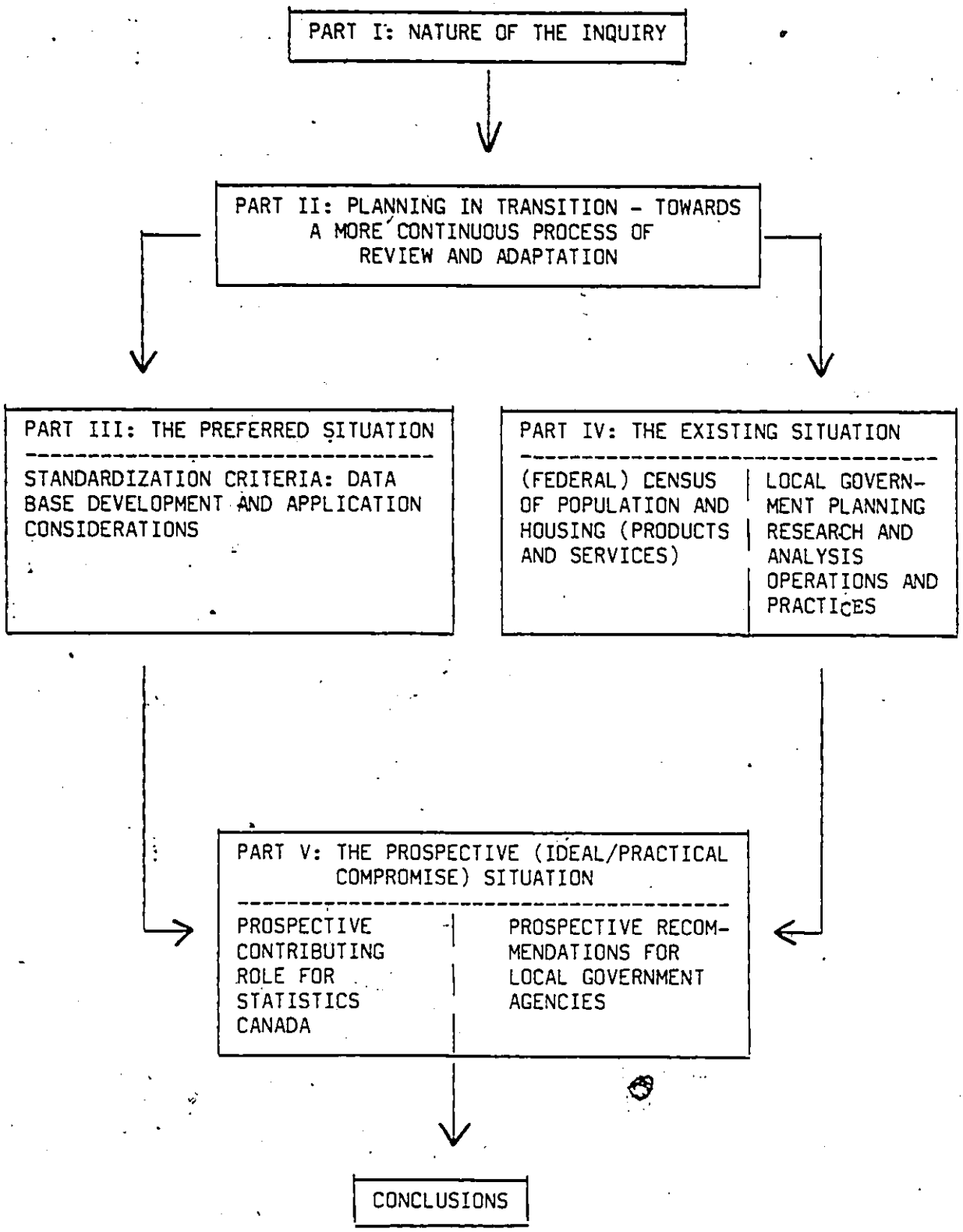
1) traditional planning thoughts and approaches and associated, established and related contributions which have shaped and influenced planning practices;
2) arguments in favour of a more continuous planning process of review and adaptation; and,
3) elaboration of the general problem statement.

Part III - proposes models of the preferred situation regarding data base development and application activities, under the umbrella of standardization criteria, both for and by local governments.

Part IV - identifies the existing data situation, in terms of:

1. the contribution of Statistics Canada (products and services of the Census of Population and Housing); and
2. local government planning, including the use of computers, the use of census products and services, the application of analytical methods and techniques, and the status of corporate planning initiatives.

FIGURE 1.0.: RESEARCH FRAMEWORK



Part V - presents the prospective situation in terms of:

1. a brief summary and discussion of major gaps/differences between the preferred and existing situations, including supplementary discussions identifying why further re-consideration of current data base development and application activities is required;
2. presentation of selected recommendations (ideal/practical compromises) to Statistics Canada regarding investigative studies and developments of potential benefit to data standardization and local area needs; and
3. presentation of selected recommendations (ideal/practical compromises) to local government agencies regarding data base development and application activities of potential benefit to the corporate function in general, and community/regional planning function in particular.

Underlying assumptions leading to development of the research framework are as follows:

a) Available literature should be the source of advice and ideas on data base considerations and requirements, and planning methodology;
b) Recent documentation on prior research and development efforts should provide a picture of the degree to which methodologies and operational activities have been adopted and adapted elsewhere in practice; and
c) Consultations with and input from planning practitioners at the local government level should help to:

   1) establish existing uses for, and deficiencies of, current census products and services;
   2) articulate further current and impending needs; and,
   3) determine prospective possibilities for employing analytical methods as part of a regular operational function within local government planning agencies.

More in-depth discussions of the methodology for, and findings from, the empirical (data) component are contained within the attached APPENDIX.

1.1. NOTES/REFERENCES

1 Mitroff, Ian I. and Murrary Turoff (1973). "The Whys Behind the Hows: Effective Application Of The Many Forecasting Methods Requires A Grasp Of Their Underlying Philosophies", I.E.E.E. Spectrum, Page 66.

PART II: PLANNING IN TRANSITION - TOWARDS A MORE CONTINUOUS PROCESS OF REVIEW AND ADAPTATION

2.0. INTRODUCTION

The purpose of this chapter is twofold: to establish a general context for the thesis and define the problem statement, by presenting brief discussions on the following three topics:

1) traditional planning thoughts and approaches, and associated, established and related contributions which have shaped and influenced planning practice;

2) arguments in favour of a more continuous planning process of review and adaptation; and

3) elaboration of the general problem statement which prompted the study.

2.2. TRADITIONAL PLANNING THOUGHTS AND APPROACHES: A LITURATURE REVIEW

Thomas Adams came to Canada in 1914, at the request of the Commission of Conservation, to help find solutions to urban problems of the time. While laying the foundation for the original town planning movement in Canada, he emphasized the need for a research capacity and the establishment of a centralized bureau to assemble and disseminate information:

> "City Planning and Housing Acts suitable for Canadian cities in each of the provinces can only be framed after the most careful and painstaking study. It may be found that something in the nature of a Central Bureau is desirable, a Bureau to which all our cities and provinces could apply for information, and through which the experience of each could be made available for the benefit of all."[1]

Whereas Adams, in general, was largely a proponent of the static, master plan concept, Patrick Geddes, in England, did not believe in absolutes. As an evaluationist first and foremost, and concerned with shaping future action directly, Geddes saw constant change as the norm and therefore insisted upon the idea that planning was a continuous and evolutionary process.[2]

At approximately the same time that Adams made his aforementioned recommendations, Geddes' publicized his advocacy of the use of information within a cyclical planning process, as noted by McLoughlin (1969):

> "Patrick Geddes (1915), one of the major prophets of the planning movement, stressed the need for wide and deep information to clarify problems, understand the context in which the plan was to operate, and provide a sense of dimension, scale, and the limits of the probable. His message was very clearly stated in the now-famous cycle of survey, analysis and plan."[3]

Information for survey purposes, research and analysis have, during the past seventy years, therefore, been 'consciously seen" as a necessary part of the planning process. Within this period a number of alternative or varying approaches for planning urban areas have been postulated, including: rational-comprehensive planning, disjointed incrementalism, mixed-scanning, transactive planning, advocacy and radical (political) approaches, technique

and efficiency (economic) approaches, and, the systems approach. In addition, there have been contributions from visionaries and reformers. Despite the proliferation of various concepts and approaches, Geddes' survey, analysis and plan process appears to have largely prevailed as the cornerstone of planning practice.

The following constitutes a series of brief and general discussions on the above mentioned concepts and approaches.

2.1.1. Visionaries and Reformers

The contribution from visionaries and reformers developed from essentially two schools of thought, both of which were comprised of people dissatisfied with overall living conditions.

The visionary or utopian thinkers, characterized by such persons as : Ebenezer Howard, Le Corbusier and Frank Lloyd Wright, attempted to seek a more ideal society through the design and planning of new physical settings. Prominent contributions in this regard, as portrayed by Myerson (1961) and Wilson, W.H. (1980), were: physical designs for new 'garden cities' (the contribution of Ebenezer Howard); 'concentrated urban societies' (the contribution of Le Corbusier); and 'broadacre cities' (the contribution of Frank Lloyd Wright). Characteristic of utopian traditions and the planning of cities, therefore, were efforts to specify and depict a desirable pattern for future living but without saying how to achieve it, and, at the same time, ignoring completely the economic, social and political aspects.[4]

Reformers, on the other hand, were less concerned with the pursuit of wishful thinking by depicting desirable future states, and more with the day-to-day concerns of planning for the present. One such reformer was Thomas Adams, mentioned above. In large part, through the efforts of Thomas Adams -- previous to and while working with the Commission for Conservation -- town planning at the turn of the century came to be seen as a potential means for reforming urban conditions by alleviating overcrowded conditions and contributing towards improved public health.[5]

Early reform efforts in the town planning movement therefore partly reflected a general concern for public welfare and sanitary living conditions.

2.1.2. Rational-Comprehensive Planning

In an effort to expand the field of urban planning and encompass a more holistic perspective (based upon the concept of rationality), the comprehensive approach became firmly established during the major urban growth years of the 1960's.

The approach was originally built upon several conceptual adaptations from other fields, the most central being the social problem/policy formulation model which assumed the relevance of a goal-identification approach to social policy making (Meyerson and Banfield, 1955). Its characteristics were: first, that goals and objectives of social action could be identified and formally stated; second, that problems thereby identified were amenable to investigations and analysis; third, that solutions to those problems could be

generated out of an understanding of the nature of those problems; and fourth, that the solutions could be measured or evaluated against the stated objectives.[6]

The Urban General Plan by T.J. Kent (1964) is perhaps one of the more prominent literary efforts to present a series of guidelines for applying the comprehensive approach to the general plan process. The functions of comprehensive planning, defined in summary terms by Altshuler (1965), are as follows:

> "One, to create a master plan which can guide the deliberations of specialist planners; two, to evaluate the proposals of specialist planners in the light of the master plan; and three, to co-ordinate the planning of specialist agencies so as to ensure that their proposals reinforce each other to further the public interest."[7]

Critics of the all-encompassing, goal-directed comprehensive approach have postulated first, that such a holistic view is unattainable, and second, fails to make clear how solutions can be generated from an analysis of problems assuming that they can be reasonably defined.[8]

2.1.3. Disjointed Incrementalism

The incrementalist approach was developed in direct, critical response to the rational-comprehensive model and presented as a more pragmatic alternative. The chief advocate of the incrementalist approach has been Charles

Lindblom who initially described it as the "science of muddling through"[9], before later further developing and expanding upon his arguments in a jointly authored text with D. Braybrooke (A Strategy of Decision).[10]

Lindblom believed that policy was developed through a method of successive limited comparisons, continually building out from the current situation, step-by-step, and by small degrees rather than starting anew each time. He recognized that the time and money which could be allocated to a policy problem was limited, and that public agencies and their administrators were generally required (politically and legally) to restrict their attention to relatively few values and relatively few policy alternatives.

The case for the incremental approach was largely derived, therefore, from such criticisms of comprehensive rationality as: insensitivity to existing institutional performances capabilities; reductionist epistemology; and failure to appreciate the cognitive limits of decision-makers who cannot "optimize" but only "satisfice" choices by successive approximations. Further criticism pertained to the tradition of expressing social values (a-priori goal-setting; artificial separation of ends from means; presumption of a general public interest rather than pluralist interest), and the bias towards central control (in the definition of problems and solutions, in the evaluation of alternatives, and, in the implementation of decisions).[11]

As discussed by Hudson (1979), according to Lindblom policy decisions were therefore "better understood and better arrived at in terms of the push and tug of established institutions that are adept at getting things done through decentralized bargaining processes best suited to a free market and a

democratic policial economy.... while plans were best constructed by a mixture of intuition, experience, rules of thumb, various techniques (rarely sophisticated) known to individual planners, and an endless series of consultations".[12] As interpreted by Eddison (1973), Braybrooke and Lindblom held the opinion that decision making was:

> "(1) incremental or tending towards relatively small changes;
> (2) remedial, in that decisions are made to move away from ills rather than toward goals;
> (3) serial, in that problems are not solved at one stroke but rather successively attacked;
> (4) exploratory, in that goals are continually being refined or newly discovered;
> (5) fragmented or limited, in that problems are attacked by considering a limited number of alternatives rather than all possible alternatives; and
> (6) disjointed, in that there are many dispersed decision-points."[13]

The incrementalist approach, despite its' more-likely reflection of the real-world situation, at best characterizes an intuitive, 'seat-of-the-pants' type of approach, employing 'seat-of-the-pants' judgement as opposed to reasoned judgement. The incrementalist approach has therefore been subject to criticism for being overly pragmatic, overly conservative, and insufficiently equipped to accomplish anything beyond maintaining the status quo.

2.1.4. Mixed-Scanning

The mixed-scanning approach, authored by Etzioni (1967), was developed as a third approach to decision-making, that is, as an alternative to the rational-comprehensive and incrementalist models. Essentially, Etzioni saw

useful contributions from both, and consequently attempted to posit a third approach bearing elements of each.

A brief discussion of the mixed-scanning approach is perhaps best provided by Etzioni himself, as presented below:

> "A more active approach to societal decision-making requires two sets of mechanisms: (a) high-order, fundamental policy-making processes which set basic directions and (b)incremental processes which prepare for fundamental decisions and work them out after they have been reached. This is provided by mixed-scanning. From an abstract viewpoint mixed-scanning provides a particular procedure for the collection of information...a strategy about the allocation of resources...and guidelines for the relations between the two. The strategy combines a detailed (rationalistic) examination of some sectors -- which, unlike the exhaustive examination of the entire area, is feasible -- with a 'truncated' review of other sectors...
>
> Scanning may be divided into more than two levels; there can be several levels with varying degrees of detail and coverage, though it seems most effective to include an all-encompassing level (so that no major option will be left uncovered) and a highly detailed level (so that the option selected can be explored as fully as is feasible). Mixed-scanning not only combines various levels of scanning but also provides a set of criteria for situations in which one level or another is to be emphasized...
>
> Each of the two elements in mixed-scanning helps to reduce the effects of the particular shortcomings of the other; incrementalism reduces the unrealistic aspects of rationalism by limiting the details required in fundamental decisions, and contextuating rationalism helps to overcome the conservative slant of incrementalism by exploring longer-run alternatives."[14]

Bearing in mind that the mixed-scanning approach contains elements of both rational-comprehensive and incrementalist versions, many of their criticisms could additionally be transferred. The main thrust of criticism, however, pertains to its failure to consider which higher level attributes should be scanned, in comparison to which specific attributes should be more thoroughly examined at the detailed level. That is, in an effort to establish a universal framework, Etzioni did not extend his arguments beyond the level of abstract detail and into a series of procedures for practical application.

2.1.5. The Transactive Planning Approach

The transactive approach was put forward by John Friedmann. Primarily, his efforts were directed towards attempting to convince others to abandon the blue-printing approach of allocative planning (from the rational-comprehensive school of thought) and replace it with a broader concept of 'societal guidance'.[15]

Friedmann's concept of transactive planning was deeply rooted in face-to-face, person-centered relations within small groups, and therefore focused on the intact experience of people's lives revealing policy issues to be addressed. Planning was not to be carried out with respect to an anonymous target community of beneficiaries, but in face-to-face contact with the people affected by decisions. Planning, in the eyes of Friedmann, was therefore to consist less of field surveys and data analyses, and more of interpersonal dialogue marked by a process of mutual learning.

Transactive planning further refered to the evolution of decentralized planning institutions that help people take increasing control over the social processes that govern their welfare. Planning was not to be seen as an operation separated from other forms of social action, but rather as a process embedded in continual evolution of ideas validated through action. More emphasis (in contrast to incremental planning) was given to processes of personal and organization development, and not just the achievement of specific functional objectives. Plans were to be evaluated not merely in terms of what they do for people through delivery of goods and services, but in 'terms of the plans' effect on people -- on their dignity and sense of effectiveness, their values and behaviour, their capacity for growth through cooperation, their spirit of generosity -- whereas incremental planning adhered more closely to the economic logic of individuals pursuing their own self-interest.[16]

The transactive planning approach, therefore, was essentially a very highly conceptual and idealistic approach to social guidance, far removed from the traditional domain of land use (allocative) planning -- the object of Friedmann's criticism -- and with little regard for the operating political context or financial capacities/limitations of public agencies in a democratic/capitalistic society.

2.1.6. Advocacy Planning

The advocacy planning movement also developed in the 1960's. It was rooted in adversary procedures, modelled upon the legal profession, and usually applied to defending the interests of weak against strong -- community

groups, environmental causes, the poor and the disenfranchized -- against the established powers of business and government. Noteworthy literary contributions on the concept of advocacy planning are those put forward by Davidoff (1965) and Mazziotti (1974).

Advocacy planning has both reflected upon, and contributed to, a general trend in planning away from neutral objectivity in definition of social problems in favour of applying more explicit principles of social justice. It has proven successful as a means of blocking insensitive plans and challenging traditional views of a unitary public interest. One effect of the advocacy movement has therefore been to shift formulation of social policy from 'back-room' negotiations out into the open. Particularly, in working through the courts, it has injected a stronger element of normative principles into planning, and greater sensitivity to unintended side effects of decisions. A residue of this can be seen in the increasing requirements for environmental, social, and financial impact reports to accompany large scale project proposals, whether originating in the private or public sector.[17]

In theory, as put forth by Davidoff (1965), advocacy planning calls for development of plural plans rather than a unit plan. In practice, however, advocacy planning has been criticized for posing stumbling blocks without being able to mobilize equally effective support for constructive alternatives (Peattie, 1968).

2.1.7. Radical Approaches to Planning

As postulated by Hudson (1979), radical planning is an ambiguous tradition, with two main streams of thinking that occasionally flow together.

One version is associated with spontaneous activism, guided by an idealistic but pragmatic vision of self-reliance and mutual aid. Like transactive planning, it stresses the importance of personal growth, cooperative spirit, and freedom from manipulation by anonymous forces. More than any of the other planning approaches, however, its point of departure consists of specific substantive ideas about collective actions that can achieve concrete results in the immediate future. This is radicalism in the literal sense of 'going back to the roots', content to operate in the interstices of the 'Establishment' rather than challenging the system head-on.

The second stream of radical thought takes a more critical and holistic look at large-scale social processes: the effect of class structures and economic relationships; the control exercised by culture and media; the historical dynamics of social movements, confrontations, alliances, and struggles. The focus is less on ad hoc problem solving through resurrected community, and more on the theory of the state which is seen to permeate the character of social and economic life at all levels, and in turn determines the structure and evolution of social problems.[18] Radicals in this tradition view conventional planning as a form of Mandarinism, playing 'handmaiden to conservative politics'.[19]

While providing well documented criticism, radical approaches to planning, like transactive planning however, deal more with long term, highly conceptual social ideals and therefore provide little pragmatic direction for planning practicioners 'required' to operate in the short term on more pragmatic issues.

2.1.8. Technique and Efficiency

In constrast to the other previously discussed, highly conceptual approach's, the technique and efficiency approach is more specific, directed towards practical application, and designed, in general, for solving problems. Contributors to the literature as examples in this regard are the works of Litchfield (1960); Litchfield, Kettle and Whitbread (1975); and Rubin (1981).

Axley (1975), another contributor, made the observation that planning was sorely lacking of a theoretical basis, and therefore suggested that welfare economics provide the means for analyzing planning-related problems and serve as a framework for developing alternative courses of action. His point of argument was, essentially, that despite the amount of literature which had been written on the subject (urban planning); "planners were devoid of a framework within which to clarify their ends, to ascertain why these should be their ends, or to fit means to ends."20

Technique and efficiency (economic) approaches essentially attempted to provide a sense of order and a means for dealing with the problems of 'choice', which, in planning, came into effect in three places:

(1) in the identification of goals;
(2) within the choice of analysis; and
(3) within the implementation of the plan.[21]

Many planners, like economists in this regard, therefore developed an interest in normative decision-making.[22] Specific examples along this line of thought include those articulated by Friend and Jessop (1977) with the concept of strategic choice and such variations as Analysis of Interconnected Decision Areas (Hickling, 1978), or Decision Optimizing Techniques (Openshaw and Whitehead, 1978). A documented example of the specific application of strategic decision-making techniques is provided by Drewe (1979) where it applies to the regional planning process.[23] Much closer to home, and where it involves the application of decision-making techniques for an innercity project evaluation is that articulated by Lash (1978), concerning the Rideau Area project in Ottawa.[24]

Unlike other planning approaches, technique and efficiency approaches attempt to fill a theoretical void in planning by postulating the development and application of more theoretically founded and rigorous methods. This approach is based on efficiency and optimization criteria, such as the introduction of corporate planning to the spectrum of public planning activities (to be discussed in detail below).

Criticism has been directed at the technique and efficiency (economic) approaches, however, by reference to perceived distortions of the political role (Bruton, 1974). Critics, in this regard, have expressed objections against the movement of planning towards that of technical determinism with less emphasis on the political role.

2.1.9. The Systems Approach:

The systems approach, as discussed by Bracken (1978), is reputed to be an important adaptation to the rational-comprehensive model. Within this context, 'systems thinking' (Emery, 1969) was used to provide a more plausible explanation of the nature of urban planning as an on-going, cyclical process within a comprehensive environment or 'ecosystem'. This approach, in effect, attempted to apply biological concepts to social organizations. A few of the more well-known literary contributions on the systems conceptual approach are those articulated by Catanese and Steiss (1969), McLaughlin (1969), and Chadwick (1972).

On the policy making and implementation side, other variants involved the application of 'operations research concepts' (Ashby, 1964) and 'urban systems modelling' (Wilson, 1968) to the mechanisms by which urban planners exercised control and management over complex urban affairs. A recent publication (Barras and Broadbent, 1982), as an example, establishes an enlightening review on the application of operational methods in structure (regional) planning for Great Britain.

An important contribution of the systems approach has been the establishment of the principle of using a range of methods to support the entire planning process. As a prime example, McLoughlin (1969) expanded upon Geddes' planning cycle (survey-analysis-plan) by postulating a six-stage planning process, briefly summarized as: survey; goals and objectives; generation of alternatives; evaluation; implementation; and review.[25] Within each stage of the planning process, then, a variety of operational methods and techniques

for analysis have been developed for selective application, while their use has been progressively on the increase, internationally, as the result of corresponding developments within the computer industry.[26]

Other contributions of the systems approach include the stimulous provided for the development of 'policy-making' methods (Batey and Breheny, 1978a; and Bracken, 1981). A more general and parallel development has been the gradual application of developing systematic methods of investigation and analysis in the social sciences to provide a better understanding of urban phenomena. Recent publications further suggest the movement towards the merging of technique and efficiency approaches with that of the systems approach (Batey and Breheny, 1978b).

While such an approach has contributed towards a clearer understanding of the nature of urban planning and its constituent process -- including the need for recursive thinking -- it has not, however, as the major point of criticism contends, made urban planning a socially more sensitive or adaptive process.[27]

2.1.10. Traditional Planning Thoughts And Approaches: An Overview

Consideration of the multitude of varying general concepts and approaches underlying and affecting current land use planning practices suggests two common themes: first, that all concepts and approaches have undoubtedly provided some measure of influence, and second, that all are subject to criticism in one form or another. Further, there appears to be little agreement as to which approach is most appropriate for practical orientation. The result, as previously mentioned, has been the maintenance of Geddes' survey, analysis and plan process as the cornerstone of planning practice.

Bearing in mind that local government planning efforts are required to operate within, first, specifically defined and provincially determined legislative mandates, and second, under the authority of the local political electorate, indications point to the premise that many of the previously discussed concepts and approaches pay little respect to the operational realities for planning in Canada. If planners are to contribute, individually, as practicioners, they must do so within established political and legislative structures, particularly if employed as 'public servants'. Further, if planners are to strive towards a higher degree of professionalism, they must place greater emphasis upon their methods, as reflected by the following:

> ".... his perspective must be broad, his talents many, and his education interdisciplinary; but competence in the methodology of his profession is the source of his power and influence.."[28]

Others have noted that professionals "often prefer to be evaluated by their procedures" and, that" ... the methods or practices employed by a government department are used as a measure of its work .... to a point where professional methods are to be established as an indirect measure of efficiency."[29] These statements emphasize a requirement for the use of methodology, particularly where theory is absent, before confidence can be won for the efforts put forward. Methodology, however, particularly methodologically designed research, does not necessarily imply technique (where technique is meant to refer to manner of performance) but rather to the placement of

orderly thought or procedure applied beforehand (as a process of deliberate anticipation directed towards bringing an expected situation under control) -- which is, in fact, the essence of planning.[30]

After many prior efforts to create, implement and maintain comprehensive, long-range static plans (subject to numerous amendments, the volume of which should serve as an indication of the plans long-term relevance), practicioners have slowly begun to accept the idea of planning as a constantly evolving, continuous process of review and adaptation. Rapid changes in the state of the economy, demographic trends, or political direction have, in the past, rendered many plans virtually obsolete. The experiences learned should be heedfully respected as we strive for improved planning and management of the areas in which we live, work and play.

With regard to prior discussions of the various concepts and approaches as directives for practical orientation, elements of 'mixed-scanning', the 'systems approach' and 'technique and efficiency' appear to have potential for local government planning practice in Canada. The following sub-section is presented, therefore, to identify a progressive movement towards 1) the application of analytical methods (and their corresponding information requirements) and 2) operation by planners within a more continuous planning process of review and adaptation.

2.2. TOWARDS A MORE CONTINUOUS PLANNING PROCESS OF REVIEW AND ADAPTATION

In a classic address to the American Institute of Planners in 1956, Martin Myerson identified a framework for linking technology and the subject of urban and regional information systems with metropolitan and municipal planning. In his address, he recognized five generic planning functions which, when combined, constituted the major elements of his framework, briefly summarized as follows:

1) A Central Intelligence Function - To facilitate market operations for housing, commerce, industry, and other community activities through the regular issuance of market analysis;
2) A Pulse-taking Function - To alert the community through quarterly or other periodic reports to danger signs in blight formation, in economic changes, population movements, and other shifts;
3) A Policy Clarification Function - To help frame and regularly revise development objectives of local government;
4) A detailed Development Plan Function - To phase specific private and public programs as part of a comprehensive course of action covering not more than ten years; and
5) A Feedback and Review Function - To analyse through careful research the consequences of program and project activities as a guide to future action.[31]

The underlying theme of his framework, therefore, was that planning involved continuous observations.

Faludi (1973) commented on Meyersons' framework by reflecting favourably on its presentation of practical proposals for implementing 'positive' planning, whilst retaining the idea of a comprehensive plan. He further commented upon Meyersons' recognition of the roles of politics and the market

(as powerful forces with which planning must reckon, and to which planning is subordinate) and the retention of his optimism for planners to play a central role in local government - "by providing decision-makers with needed information".[32]

When McLoughlin (1969) presented his interpretation of the systems approach to urban and regional planning, he strengthened many of Meyersons' postulates by emphasizing "that all purposeful action is based on the possession and use of information."[33] While attempting to answer his own questions as to the kinds of information required, its availability, organization, use, etc., McLoughlin drew attention to the works of Clawson and Stewart (1965) on land use information.

Clawson and Stewart's study, while recognizing that all man's activities took place at some point in time and space, emphasized the need for improved statistics on land use and established recommendations towards a more ideal state of information collection, aggregation and dissemination suited to land use planning needs and purposes. The following comments serve to identify the rationale behind the pursuit of a more ideal state for land use information, as it applied to the United States:

> "Land uses are changing in numerous and often complex ways, and further changes in the future seem certain. In this dynamic situation, accurate, meaningful, current data on land use are essential. If public agencies and private organizations are to know what is happening, and to make sound plans for their own future action, then reliable information is critical. But in the United States land use data have evolved gradually, piecemeal, to meet specific limited needs. They have served those needs well, but no comprehensive system of collection, analysis, and

> publication of land use data has ever been put into operation. There has not even been full agreement as to land use defintions and concepts. Each specific data source has used definitions most useful for it, or most easily applied; each has tended to lump together highly varied uses which were not of prime interest to it. One man's miscellaneous was another man's prime concern."[34]

What Clawson and Stewart regarded as a more ideal state for land use information back in 1965 is pertinent today, particularly in Canada since planners have shown little initiative in terms of seeking improved data products and services. Further, planners have not generally remained current in terms of developing a statistical and quantitative competence as well as an appreciation for the value of computer technology necessary for adaptation to more systematically based approaches (except in some of Canada's larger municipalities.)[35]

Professional planning pursuits have subsequently been criticized on a number of fronts - concerning the use of technology, the application of analytical methods and techniques, and even the organization of planning agencies. In response, new directions have been suggested, as reflected by the following:

> "The organizational requirements of a planning system...can not be met by most local and regional governments in existence today. A whole new approach to government organization for planning is required...an organization for planning where the continuity of the planning process and the need to involve many more disciplines and interests in planning are the basic principales. The management of cities would be shifted away from command and production principles of control to a more participative decision-making process in which planning would become a management function in its own right.

> The role of the planner in this new planning process is to co-ordinate and integrate the efforts of the many new participants in planning. He must help define the problems, break them into their constituent parts, coordinate the investigation, and then integrate the findings in a form suitable for public review and decision making. Furthermore, the planner must monitor and report upon the impact of the decisions taken, and make recommendations for modifying policies, plans and programs.
>
> In the future, planning will require a broad understanding of the community and its systems as well as the political and operational environment in which policies, plans and programs must be carried out. Planning will have to use the most advanced tools for the management of information, the analysis of urban systems, and effective communications between numerous groups and disciplines."[36]

The preceeding observations reflected the Canadian data base and use situation in 1976. Central to the observations is the concept of corporate planning. Corporate planning in local government, as discussed by Michael J. Bruton (1974), determines the activities of a local authority in relation to the needs and problems of its area and of those who live and work within it. It is concerned with all the activities of the local authority, whether they involve physical development or social action, whether they involve capital or revenue expenditure, and whether they involve resources of land, personel or finance. It has gradually been developing in local government (although more so in the United States and Great Britain than in Canada - until very recently) as a response to problems identified in the management of local government and as a response to a set of ideas on how those problems should be met.

The movement towards corporate planning in local government has been paralleled by the impact of systems thinking, with references to the need to set objectives and to monitor performance. It is, therefore, the combination

of a wider management task of the local authority, with an emphasis upon planning as opposed to administration. The heightened need for planning arises because the task requires a general review of needs and problems of the area governed by the local authority.

The logic behind corporate planning does not, however, attempt to depoliticize the emphasis of local government, as critics of the technique and efficiency and systems approaches have postulated. Rather, it attempts to 'change the political dimension', as discussed by Bruton:

> "... the political dimension, to which the local authority should be more effectively structured. This perhaps requires three changes, of which the move to explicit policy-making is one, provided that the policies are stated in terms that expose political choice rather than hide it. It also requires new roles for the councillor. Too often the councillor is imprisoned by the agenda of the committees on which he serves. Roles in which he can explore policy issues in depth before they are formalized into committee papers, or investigate their impact after they have been implemented, need to be developed. Above all he needs independent support by information, research and analysis services."[37]

Early attempts to establish and integrate corporate planning strategies have been characterized by the set of procedures most commonly referred to as PPBS (Planning - Programming - Budgeting - Systems), described in brief, as follows:

> "The PPBS system provides a framework for identifying areas for analysis. A programme review, which is the procedure by which the results of programme analysis are fed into the policy-making system, involves periodic review of activities within a given programme area (that set of activities contributing to a major

> objective of the authority constitutes a programme area), identifying major changes in the problems faced in that programme area, selecting issues for further programme analysis, applying the results of past analysis and setting out proposals for programme change."[38]
>
> "PPBS is essentially an approach to decision-making. It is not a technique but a way of presenting information in a systematic way so as to expose policy choices, making as explicit as possible the costs and consequences of these choices."[39]

Attempts to incorporate or merge a systems/corporate planning approach within the traditional land use planning domain, have not, however, been without their share of controversy. There have been attempts by many local governments to establish research and intelligence units for the authority (similar to that originally proposed by Meyerson) in an attempt to improve the background environmental analysis on which any developed system of corporate planning must draw. Most notable of such attempts is that documented by Barry S. Wellar (1973) concerning the Urban Information Systems Inter-Agency (USAC) Experience, within the United States.

The controversies have not only resulted from technical considerations associated with such progressive changes, but, in large part, also because of prevailing traditional attitudes. As previously mentioned, planners in general have not remained current in terms of developing a quantitative competence or an appreciation for the value of computer technology. Their lack of willingness to 'get with it', therefore, may well have been lodged in a fear of having their traditional roles and functions usurped by concepts for which they have little formal background. As noted by Bruton (1974), however, this fear is a misconception, the continuation of which will only serve to compound further complications, as reflected from the following:

> "Corporate planning does not remove the need for these other forms of planning. Rather, it sets a framework within which they can operate more effectively.... The way ahead lies in the building not of one plan - for there will always be many plans - but of one process, a corporate planning process from which many plans can emerge. It does not matter what it is called, provided it is conceived on a corporate basis. The danger of structure planning is that it will be conditioned by the physical traditions on which it is based. A structure planning process that was comprehensive in scope and drew on the corporate resources of the authority would embody the ideas of corporate planning and include all its characteristics. It would not then matter whether it was called corporate planning or structure planning. The aim is one planning process drawing upon all the resources of the authority to deal with the problems it faces. From the one process many plans can emerge."[40]

The corporate planning framework therefore serves to establish the 'management-like' component to planning while the monitoring and review functions serve to establish planning as 'a continuous process of review and adaptation'. The major area of contention, however, involves the appropriate application of systematic methods within a continuous, adapting process.

The following statement reports, in explicit fashion, on the British situation as of 1981 and, in essence, comments upon the previously discussed debate over concepts and approaches of planning practice:

> "In practice, the past fifteen years or so of British strategic land-use planning (Structure Planning) have been dominated by two principal debates about the nature and methodology of the activity. The first of these has focussed upon the search for a 'new style' of plan and policy making that would break away from the inflexible development framework of the erstwhile Development Plan system. The second area of debate has concerned the application of rapidly developing

> systematic methods, particularly of analysis, forecasting and problem-solving to the planning process. This debate has focussed upon the extent to which such methods can and should contribute to plan and policy formulation, so that, for example, planners might be better informed about the world, or better able to predict the consequences of particular actions and so on...
>
> Given also the broad intention that Structure Planning should become a more managerial, continuous process of review and adaptation to policy (in order to avoid the limitations of the 'end state' approaches of the past), most local planning authorities have begun to formulate the organizational and procedural frameworks by which such implementation may be carried out. An essential concept in this role is that of monitoring whose broad function is to express on-going change, to measure the impacts experienced as a result of implementing plans and policies, and thereby reveal the need for, and requirements to be met by, the plan review."[41]

In light of the above, current literature now points towards recognition of the need to reorganize the planning process around a much closer and more functional arrangement of forecasting, evaluation, implementation and monitoring,[42] as opposed to McLoughlin's (1969) six-stage process.

Recent publications, discussed below, indicate that approaches to professional planning practice in Canada are in a state of transition similar to that of Britain. The first indication comes from the recently released report of the Task Force of the Canadian Institute of Planners.[43] The Future of the Planning Profession Task Force recommendations emphasized the need for greater use of forecasting techniques as well as the need to monitor the effects of proposals and regulations instead of taking them for granted.[44]

The second indication of planning practice change is provided by a planner currently practising in Canada:

> "...planning is a continuous process of analysing, evaluating and recommending appropriate courses of action. This fact was recognized in the updated ORP by providing for a continuing capability for Lower Mainland planning coordination... to assess the performance of the updated Plan and to carry out the amendments, adjustments and revisions which will be needed as circumstances change... A monitoring program for the Official Regional Plan should indicate where development trends are leading, what effect the existing strategy and policies of the ORP are having and to suggest minor adjustments to the plan or to signal a major plan review if required.... Decisions and actions should be based upon the most accurate and up-to-date information on the current situation."[45]

Other indications derive from three recently released Canadian studies, characterized as 'tooling-up reports'[46], and a variety of Canadian articles on the development of municipal information systems for planning applications.[47]

One consideration which remains to be addressed, however, concerns the primary input ingredient... the information! Few Canadian studies have dealt, in depth, with information needs for planning and particularly in terms of information needs within a more continuous planning process of review and adaptation. The matter of changing information needs for urban and regional planning in Canada requires, therefore, serious consideration if planners are to appropriately respond to changing circumstances.

2.3. GENERAL PROBLEM STATEMENT

The general domain of information needs is briefly described by the following:

> "Planning in local government requires a data base that describes the physical, social and economic subsystems operating within the local government jurisdiction."[48]

Planners gather their data, however, from a wide range of disparate sources -- from aggregate, nationally published data to locally generated surveys -- and the quality varies enormously. Some data may be recent, other data considerably out-of-date.

Prior research established that Canadian municipalities (where all municipal functions are considered) spend up to as much as one-seventh of their annual operating budgets on information collection, processing and transfer, with planners regarded as one of the most extensive data user groups.[49] Due to budget limitations and the high costs associated with the collection, compilation and processing of information from locally generated surveys, however, it is apparent that planners will continue to be dependent upon data collected, compiled, processed and disseminated by other agencies.

One source for data products and services is the federal Census of Population and Housing conducted by Statistics Canada. The federal census is, undoubtedly, the most widely referenced, comprehensive and continuous national data base on the demographic, social and economic characteristics of the

Canadian population. As a primary source of data for planning-related purposes, however, the products and services of the federal census have been criticized in terms of their relevance for local area analysis:

> "One of the sources of information used for planning is the Federal Census. While census data is useful and very widely used, there are several problems associated with its use:
>
> 1) the data is collected on five and ten year cycles only;
> 2) there is a considerable time lag before the data becomes available;
> 3) data is not available on all small areas because of confidentiality restrictions;
> 4) the basic reporting unit, the census tract, is not stable over time;
> 5) the requiredstudy area boundary may not match well with the census boundaries.
>
> For these reasons, it is not uncommon for the municipality to utilize the census system, DIME in the USA and AMF in Canada, to process their own data. This also has some disadvantages:
>
> 1) the area definitions may not be fine enough;
> 2) the Geographic base files are often not up to date;
> 3) in general, the systems have been designed to meet the requirements of the Federal Census and the municipalities are required to fit in."[50]

From the perspective of planning as a more continuous process of review and adaptation similar in substance to the Planning Monitoring System developed for the Greater Vancouver Regional District in British Columbia (George, 1977), the contribution of (federal) Census products and services can perform only a limited role, further constrained by many of the previously cited criticisms. For the establishment of a monitoring function with considerations of social and economic consequences as well as physical, the temporal

considerations are particularly acute, as are other questions related to comparability, spatial resolution and dissemination.[51]

The result of the above mentioned limitations has precipitated widening differentials in the capabilities of planning agencies to overcome many of the associated problems while attempting to satisfy their data requirements. As an example, the City of Edmonton -- with the aid of extensive technical and human resources -- has of late, been able to overcome many of their associated data problems through the use of local administrative record files and the conduct of their own limited, annual municipal census.[52] Other municipal and regional planning agencies lacking such resources, however, are incapable of accessing local administrative records. They are further required to function without the benefits derived from the conduct of a locally generated, annual census.

Based on observations of developing trends in British planning operations, Bracken (1981) recently came forward with the prediction that:

> "Planners will increasingly find that aggregate, published data will serve their local needs and this monitoring role inadequately, and the importance of obtaining good quality 'local' information will increase."[53]

Although his argument was based on the British situation, it was meant to be universal, and therefore transferable to the Canadian situation. In light of his argument, yet another element is added to previously mentioned federal census shortcomings, that of data quality as illustrated by the following observation:

> "The problem in urban planning is not so much the acquisition of enough data, but rather of obtaining data of adequate quality. It is a popular misconception that urban understanding can be achieved in some way by the mere accumulation of factual information. Rather, understanding is served by the development of, at first localized then more general, theory which can be confirmed by real world observation. Such development requires, not only good quantitative and qualitative descriptions, but also an ability on the part of the researcher to make comparisons among the phenomena, particularly over time. It follows that an absolutely essential ingredient will be that of standardization, both of descriptions and procedures, in order that one set of findings may be readily and objectively compared with others."[54]

Consideration of recent developments towards changes in the application of urban and regional planning analysis, the problems and limitations of current (federal) Census products and services as inputs for planning, and the need for standardization, leads one to question the existing and future roles and potentialities for the federal Census, in as far as the contribution for local government (urban and regional) planning is concerned. The remainder of this document therefore attempts to identify the preferred versus the existing situations for data base development and applications activities: that is, attention is focussed on the data base development activities of the (federal)

Census of Population and Housing, and the functional activities of forecasting and monitoring as data base applications activities in local government (urban and regional) planning.

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PART III: THE PREFERRED SITUATION

3.0. INTRODUCTION

The purpose of Part III is to propose models of the preferred situation for data base development and application activities for local government planning, under the umbrella of standardization criteria. Data base 'development' activities are considered in either of the following contexts:

1) local government planning agencies as 'producers' and 'users' of data products and services; or
2) other agencies external to local government (i.e., federal or provincial agencies or other private sources) as 'producers' and 'suppliers' of data products and services relevant for local area analysis.

Data base 'application' activities, therefore, refers only to data applications and operational activities within the local government (planning) domain.

Available literature and documentation for both data base development and applications activities is extensive. In order to reduce the quantity of this discussion, materials have therefore been selectively referenced and confined to the conceptual level. Discussions, as such, are not intended to be exhaustive for each area of concern.

Included in this chapter are brief presentations and discussions of the following, as sub-categories for the preferred situation:

1. Data standardization;
2. Considerations for the specification of data elements, items and formats;
3. Data acquisition considerations;
4. Data storage/retrieval/manipulation considerations;
5. Data dissemination considerations;
6. Data applications -- considerations and requirements.

3.1. DATA STANDARDIZATION

A decade ago the Ontario Economic Council (1973), in its review and assessment of municipal planning in Ontario, placed particular emphasis (as a recommendation) towards the use of computer techniques to utilize municipal plans and planning data in the resolution of municipal management questions. There is, however, a spectrum of activities associated with the preparation of data inputs (data base development activities) to be considered, plus a variety of additional considerations concerning the use of such data inputs (data applications activities) within a context of local area analysis in urban and regional planning. A primary first consideration is data standardization.

Data standardization is a subject of concern which has been talked about for at least the past two decades. Within this time period a number of planning-related documents have been produced which address data standardization in terms of problems, proposals and methods of solution -- in England, the United States, and in Canada.[1] Many efforts, however, have been largely prescriptive in nature (as opposed to developmental) with a few scattered, incremental efforts in terms of implementation.

The importance of data standardization to governmental operations in general and hence local government planning -- with regards to the preferred situation for data base development and applications activities -- has previously been researched and cited, in the Canadian realm, as evidenced by the following:

> "The matter of standardization of data common to all levels of government is one which is of the most urgent and pressing significance. It has been pointed out that the standardization of data elements in common use, and of codes used to represent these data elements, will promote a better understanding among governments of the information being processed, will improve its reliability and enable it to be exchanged and summarized without expensive and time-consuming reprocessing arrangements."[2]

One of the largest and more adquately documented attempts to develop and implement standardization criteria come through efforts in the United States; in particular the Urban Information Systems Inter-Agency (USAC) experience. The USAC project, in large part, consisted of a substantial investment of financial, technical and human resources by federal, state and local governments with the initiation and progress of six consortia research and development projects. The primary intent and purpose of the six experimental projects was to conceptualize, design, develop, and implement computer-based municipal information systems from which, it was originally intended, the products and processes from the six USAC cities could be transferred to the hundreds of cities in the United States that had initiated or were initiating municipal information system efforts of their own.[3] The importance of data

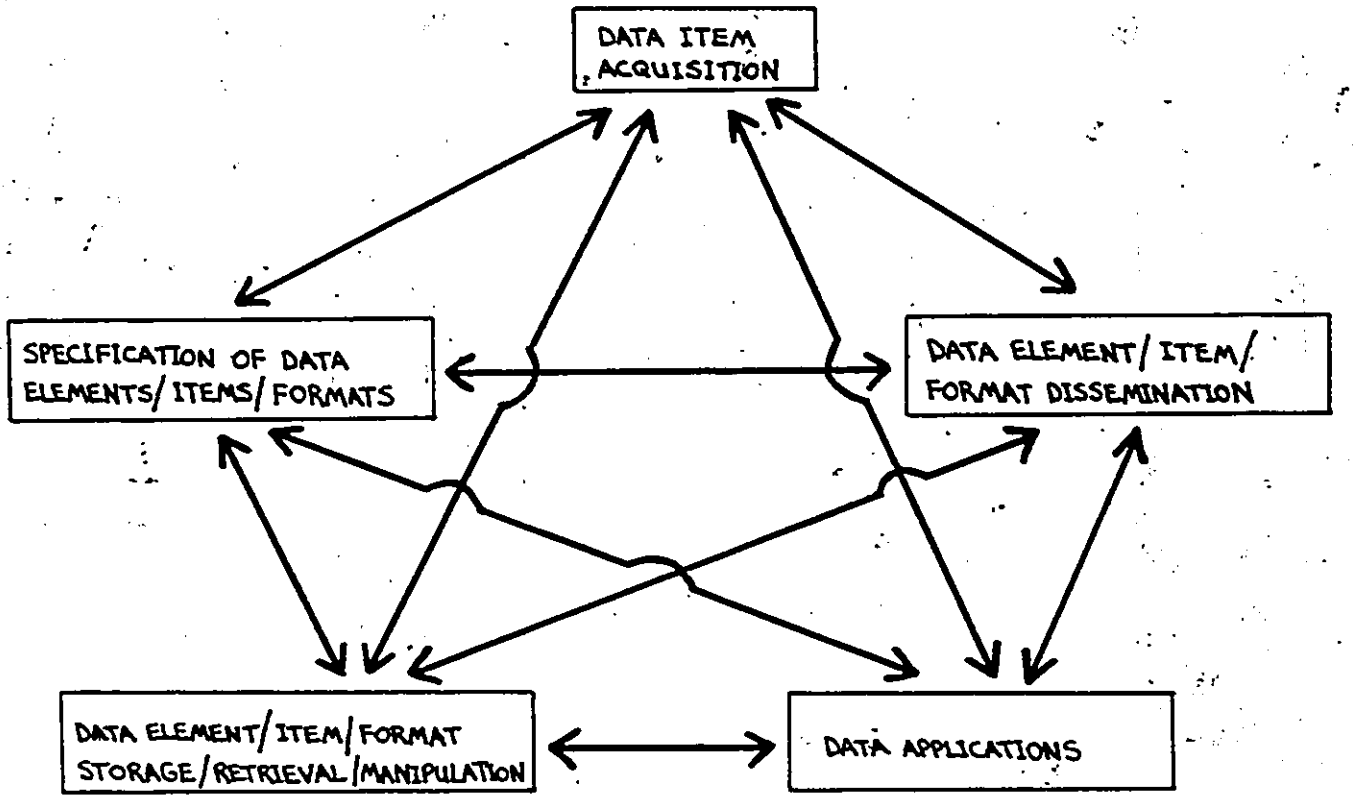
standardization to the overall developmental effort was recognized from the beginning and subsequently included within the project objectives as follows:

> "... to encourage the standardization of data and inventories of data, both vertically through successive levels of government, and horizontally at each level."[4]

A framework developed as part of the USAC effort (in pursuit of the objective for standardization) was conceptualized (Wellar, 1971) with the suggestion of five essential phases or components for the development of standardized data bases to be considered in the conceptualization, design, development, implementation, and/or maintenance of an information system -- briefly outlined as follows:

> "1) the specification of data elements/items/formats -- which involves defining that set of data elements, items and formats which comprise the inputs to programs, projects, data bases, etc.;
> 2) the acquisition of data items -- which involves the making and recording of observations (data items) that report on the status of data elements;
> 3) the storage/retrieval/manipulation of data elements/items/formats -- which involves the data handling or processing operations (manual and automated) that are performed upon raw, processed and semi-processed data;
> 4) the dissemination of data elements/items/formats -- which involves the delivery of data (elements/items/formats) to users (man and/or machine based); and
> 5) the application of data elements/items/formats -- which are performed by the users as they carry out their operations/control/planning-related activities."[5]

FIGURE 3.1.1.: SCHEMATIC REPRESENTATION AT AN AGGREGATE LEVEL OF THE BI-DIRECTIONAL RELATIONSHIP BETWEEN THE PRESCRIBED PHASES OF DATA BASE DEVELOPMENT*



* Source: Wellar, Barry S. (1971). "Data Standardization", Wichita Falls Consortium Phase II Report, Vol. XII - Conceptualization Themes: (IMIS System Project) Transferability, Data Standardization, Confidentiality, and Geographic Information Systems. A Report prepared under Contract No. H-1217 - Municipal Information Systems. Federal Urban Information Systems Inter-Agency Committee, U.S. Department of Housing and Urban Development. NTIS No. PB-208 485-12. (Springfield Virginia: National Technical Information Service, Operations Division, U.S. Department of Commerce).

The fives phases were perceived as hierarchically interdependent (portrayed graphically in FIGURE 3.1.1.) comprising an iterative chain of events, whereby: poor articulation of the specification component would impact negatively on the acquisition, storage/retrieval/manipulation, dissemination and applications components; poor articulation and conduct of the acquisitions component would impact negatively on the storage/retrieval/manipulation, dissemination and applications components; etc., and so on.

The primary emphasis for Part III therefore infers that the preferred situation for data base development and applications activities for improved local government planning research calls for the standardization of data elements, items and formats consistently throughout the specification, acquisition, storage/retrieval/manipulation, dissemination and application phases. As pointed out elsewhere (Wellar, 1972[a]) the number of possibilities (i.e. in terms of data elements, items and formats) that could be generated in the attempt to develop and implement total/exhaustive information systems for urban and regional research, further serves to emphasize the need for standardization. As a result of the very large number of possibilities, however, it is unlikely that the common agreement required to achieve total standardization can be easily won.

The remainder of Part III therefore does not attempt to be exhaustive, as previously indicated, having chosen instead to bring forward a series of talking points based selectively on the considered findings and postulates of others.

3.2. CONSIDERATIONS FOR THE SPECIFICATION OF DATA ELEMENTS, ITEMS AND FORMATS

As previously identified in Part II, planning at the local government level requires a data base that describes the physical, social and economic subsystems operating within the local government jurisdiction. The author further went on to state, however, that:

> "One of the most critical parts of developing a data base for planning is deciding upon what objects and events to observe and record, and assigning a spatial measure."[6]

This statement essentially reconfirms prior statements from the USAC effort concerning the overall importance of the specification component.

Wellar (1971), as discussed, put forward the premise of a hierarchical yet interdependent relationship between the data base development components. That relationship, specifically as it refers to the specification component, was identified as follows:

> " i) the specification of data elements/items/formats determines the methods to be used in acquiring data, and available acquisition methods constrain data element/item/format specification;
> ii) the specification of data elements/items/formats imposes requirements upon the system's data handling capability (for storage/retrieval/manipulation), which in turn determines whether demands for data can be met;
> iii) the forms, formats and data set contents that are specified and which comprise the data acquisition activities, reflect on data dissemination and vice-versa; and

> iv) the data elements/items/formats specified as inputs to the systems define the applications for which data can be used, and present and future applications establish requirements for data inputs."[7]

The specification component therefore requires serious "beforehand" consideration, that is, as a pre-planning initiative.

Shapiro (1959) recognized that inquiry in to any field of study required the initiation and establishment of classification systems. His arguments were presented as follows:

> "Inquiry into every distinct field of study must begin with classification, that is, the sorting of a set of phenomena composed of generically-alike units into classes or kinds, each class or kind consisting of members having definable characteristics in common."[8]

Without classification, phenomena would remain bewildering and ambiguous, whereas generalizations of phenomena would be impossible since every researcher conducting studies would be required to retrace the same paths of all those before him. The task of specifying data elements/items/formats would therefore be greatly enhanced by the aid of appropriate classification systems.

The practice of planning, in Canada as well as elsewhere, has maintained a traditional orientation towards the physical concerns; i.e., a preoccupation with the orderly and efficient use of land (Tindal and Tindal, 1979). The concept of land use, however, has been poorly treated and ill-defined. Clawson and Stewart (1965) held the contention that since every

human action takes place at some point in time and space, one could thus conclude that everything which happens in the career of a person -- from the cradle to the grave -- involves activity on the land,"that is, as a form or expression of land use. There have been many publications, however, advocating that the many and varied notions of land use need to be clarified and subsequently framed within an appropriate, clear, yet flexible system for classification (Guttenburg, 1965; Hodge and McCabe, 1968; Ontario Ministry of Treasury, Economics and Intergovernmental Affairs, 1974; and Scace, 1981).

Clawson and Stewart (1965), as referenced by Scace (1981), recognized nine major ideas or basic concepts about land for consideration in the establishment of land classification systems:

> " i) Location on the relation of a specific parcel of land to the poles, the equator, and the major ocean and land masses.... There are also relationships between various tracts of land as well as political locations;
> ii) Activity on the land - for what purpose is a piece or tract of land used?;
> iii) Natural qualities of the land including its surface and sub-surface characteristics, and its vegetative cover;
> iv) Improvements to and on land -- such as buildings, road surfaces, utilities, etc. -- which is closely related to activities, although the two are quite distinct;
> v) Intensity of land use, or amount of activity per unit of area;
> vi) Land tenure -- who owns the land, who uses it, etc.?;
> vii) Land prices, land market activity and credit as applied to land;
> viii) Interrelations in the use between different tracts of land.... no piece of land stands alone; and
> ix) Interrelations between activities on the land and other economic and social factors."[9]

Guttenburg (1965) emphasized that a classification system must be capable of putting land use data into a form which corresponds to the practical concerns and responsibilities of planning. In their report to the Town Planning Institute of Canada (the forebearer to the existing Canadian Institute of Planners) Hodge and McCabe (1968) echoed Guttenburg's concerns. They further identified a series of additional desirable features to make land use classification and coding systems comprehensive yet flexible, within the requirements imposed by the planning process:

> 1. It should be simple and allow freedom of file design to suit specific needs, approaches and philosophies;
> 2. It must be based on exact definitions of land use dimensions;
> 3. Full use of data series maintained by other agencies and departments must be allowed, along with a choice of analytical approach;
> 4. It must provide a sound basis for description, analysis and projection under a wide range of technical and budget limitations;
> 5. It must enhance the planner's capability of introducing economic, legal, sociological, architectural, engineering, and other considerations, into the analytical and prescriptive phases; and
> 6. It must be a tool for the furthering of the development of planning as a discipline."[10]

With regards to the specific types of information required for local government (urban and regional) planning, authors from a Task Force on Local and Regional Government Data (Auld et al, 1974) attempted to clarify information needs in relation to the types of applications they would/could be put. For 'planning and physical development', as otherwise referred to at the time, the analysis and data requirements were identified as follows:

> "... The analyses undertaken for planning purposes consist, in most instances, of trying to understand and evaluate relationships between land uses and the activities of people using the land now and under future conditions. That is, how are present land uses and activities related to one another now, and how would some proposed development change this? ... Information on the nature and adequacy of present housing and the character of surrounding land uses will be needed, as will information on projected population expected to inhabit the new housing, anticipated demands for public utilities and other services such as schools and roads, and the physical capability of the land to support the construction. The foundation of a municipal information system for planning must include several sets of data that could provide profiles of land use, improvements, population, and establishments (business, government and institutional). The aim of such a system would be to place proposals for change in a perspective of existing patterns of land use and activities in the municipality."[11]

Based largely upon their nine major ideas or basic concepts about land, Clawson and Stewart (1965) put forward six points which, at the time, were considered to represent the major characteristics of an ideal system of land use data. The six points are particularly relevant to the specification component for data base development because of the close association with and relevance to the remaining components. The six major characteristics were identified as follows:

1. Data about land should employ a single or pure line concept and avoid mixing two or more concepts in a single classification scheme;
2. It should be based upon recording at the data-gathering level, of the maximum amount of detail with the minimum of classification at this stage (so that it can be subsequently used either in great detail or in summary form, and be capable of many different kinds of re-combination without altering the classification itself);

3. Data at the field level should be obtained for the smallest recognizable parcels of land....each parcel must be delineated unequivocally on the ground or at the basic data collection phase, so that there will be no question where one parcel ends and the other begins, and every parcel can be accurately located in terms of some competant land description and land location system;
4. It should provide data adaptive to processing by modern data-processing equipment;
5. It should be capable of improvement or change within the framework of the established system, not requiring its scrapping and complete replacement (new data systems must consider compatibility with old data systems). Recording of land use or other information, in detail for relatively small land parcels, means that parts of either the category or area system can be replaced without disturbing the main body of either); and
6. It should provide for systematic, frequent and prompt updating.....it should be possible to update data for those parcels involved while at the same time leaving data for other parcels unchanged."[12]

In sum, the specification component for data base development and applications activities is unquestionably the most important phase, due to the dependency of the remaining phases on such pre-planning activities. From a local planning context, however, as discussed, there are considerations and requirements which need to be respected particularly during the specification stage in order to be of maximum utility to local planning.

3.3. DATA ACQUISITION CONSIDERATIONS

Data acquisition, which involves the collection and recording of observations that establish or report on the status of the data elements to comprise the system's data inventory and/or data acquired from outside sources, has been identified as a major and consistent problem for data base development activities:

" i) concerning the establishment of priorities in the data acquisition chain of events (in terms of developing a data acquisition plan);
ii) concerning the assignment of responsibilities, particularly for situations where data are collected by one or more agencies and subjected to multiple use;
iii) concerning a general requirement for historical data in machine-readable form; and
iv) concerning the methods for data acquisition."[13]

A more ideal data acquisition plan is one which provides for the generation of accurate, timely and compatible data items, while simultaneously meeting the resource constraints (financial, human or technical) imposed upon it (Wellar, 1971). As such, a data acquisition plan, as specified by the System Development Corporation (1968), must recognize the dynamic nature of a data base. It must consider existing machine-readable and non-machine-readable data from other operating agencies and the feasibility/costs of converting non-machine-readable data into machine-readable form (which may in itself require a distinct plan for conversion of existing data and the collection of new data in the light of available resources). Data items taken from different jurisdictions or outside agencies are often defined differently and cannot be merged into a single file unless they are converted into a common set of units and a standard format, which is particularly acute where data is acquired from another agency through a shared data base. An important component of the data acquisition plan, therefore, is the development of inventories of existing data in terms of format, content and availability, (to ensure data compatibility).

Where it concerns the assignment of responsibilities for data acquisition, consideration should be given to the use of persons or other data sources that are equally competent, qualified, or discriminating in their abilities to make observations and record data. The current state of data acquisition (in Canada and the United States), has been identified as 'evolving gradually and piecemeal by many different agencies to serve their individual needs' (Clawson and Stewart, 1965; Barcelo et al., 1971). The result has been considerable duplication of effort, most likely to remain unchanged until data acquisition practises are standardized (that is, to generate increased confidence associated with the willingness of each agency to use another's data).

Regarding the requirement for historical data in machine-readable form, problems are likely to persist in the near term due to the lack of prior efforts to acquire, process, store and maintain data in standardized and machine-readable format. Over the long-term, requirements for historical data in machine-readable form can be overcome through unified use of standardized recording forms, definitions, classification systems and coding formats. With regards to data as they pertain to land use or activity on the land, Clawson and Stewart (1965) put forward two suggestions which, if implemented, would eventually help eliminate the current problems of establishing historical data. Their proposal was as follows:

> "The commonality in our proposed system of land use data lies in two major characteristics: (1) detailed data on land use or activity on the land, at the enumeration and data tabulation level, with classification or grouping of uses only at the later analytical stages; and (2) data recording and processing on the smallest identifiable parcel or areal unit, so that areas may later be grouped in any desired way. The commonality lies in standardized building blocks, which provide the opportunity for use in numerous ways. The commonality lies in standarized building blocks, which provide the opportunity for use in numerous ways. The system may be described as one of standardized parts capable of an individualized output. It has great flexibility to meet present conditions and problems, and to deal with future situations as they may arise."[14]

Until recently, the conversion of historical data from non machine-readable to machine-readable format has involved clerically conducted keypunch operations which are both time-consuming and expensive. Long term means for overcoming this problem require that data be initially captured in machine-readible format backed up by good system design (System Development Corporation, 1968). Recent publications have, however, identified the use of optical character recognition equipment to read field-prepared source documents in combination with machine prepared turn-around documents, which, over the short-term, are capable of eliminating the need for labour-intensive key entry operations (Huneycutt, 1978).

Where it concerns the methods for data acquisition, there are currently a variety in use, each with their own advantages and disadvantages for providing local area data. Current methods could include the use of questionnaires, field surveys (special or regular), aerial photography/remote sensing, traffic counters, administrative data records, secondary data generated by

other agencies, etc., which could be used either separately or in combinations. In most instances, the specific method to be used has depended upon the situation at hand (depending upon the type of data required, specified frequency, level of precision, etc.).

Regardless of the specific method to be used, Clawson and Stewart (1965) emphasized that for any program of data collection, processing and analysis, specifying the location of each area is absolutely basic since accuracy of location is always a relative matter and never absolute. Further, at the level of field enumeration it is essential to have a location system for describing land which the respondent knows or can identify from simple maps and photos, meaning that it may be highly desirable, if not essential, to describe the same tract of land in more than one way.

Generally speaking, there is much to be gained by enumerating or assembling data according to location systems which are meaningful to the persons concerned, such as the enumeration of housing in an urban area by street name and address, or by cadastral survey description. Later presentation of data should be according to units or areas that make sense to the audience.

Data obtained or recorded by one system can, however, be translated to another. Equivalency tables can be prepared showing which street addresses to group into a census block, or any other desired grouping. Data by any local system can be converted into data by latitude and longitude co-ordinates. All such conversions can be done by computer if each parcel is accurately located. The smaller the units by which data are recorded or the building blocks in a data program, the more accurately they can be made to fit any other geographic system of identification.[15]

3.4. DATA STORAGE/RETRIEVAL/MANIPULATION CONSIDERATIONS

The third component for the development of standardized data bases concerns the storage/retrieval/manipulation of data elements/items/formats, that is, the data handling or processing operations (manual and automated) that are performed upon raw, processed and semi-processed data.

Regardless of whether data are to be stored/retrieved/manipulated by manual or computer-assisted methods, precedents have been established to ensure that data be maintained in a uniform and consistent manner, particularly since planners have been identified as requiring large amounts of data (Ontario Ministry of Municipal Affairs and Housing, 1982b; Barcelo et al., 1971) and generally collect their data from a wide variety of disparate sources (Barcelo et al., 1971; Bracken, 1981). Identified as requirements for the maintenance of data in a uniform and consistent manner are examinations of the data base structure of the information system (providing such a system exists) including the files, records, and fields to be used in storing data; considerations of classification, coding and format schema to ensure that storage/retrieval/manipulation practices are compatible with respect to data that are endogenous to the system; and, consideration of the data and report generation within the system in order to relate data processing stages to operations/control/planning activities in combination with further considerations of how both permanent and transient data are to be handled by the system (Wellar, 1971).

3.4.1. The Expanding Use Of Computers

Prior research has emphasized that where computer-assisted methods are not in use for data storage and retrieval (for local government planning operations for example), resulting manual efforts conducted in this area are very often both inefficient and ineffective (Ontario Ministry of Municipal Affairs

And Housing, 1982b). Where large quantities of data are involved -- which is most often the situation for medium-to large-sized municipal and/or regional planning authorities -- manual processing and maintenance methods can be very time consuming and not always produce the required information in time for subsequent analysis or decision making. Partly as a result of the ready access and retrieval of data in an orderly fashion that computers can offer, the use of computers in planning has, over the past decade, in Canada, been receiving greater interest and attention. Other factors contributing to the change of interest have been identified as follows:

i) a rapid decline in certain hardware costs;
ii) the introduction of affordable micro computers;
iii) an accelerated interest by municipalities to establish computer-based information systems;
iv) an increase in the availability of data in computer readable form;
v) better access to computer facilities through time-sharing, multi-programming, and a more universal on-line use of computers;
vi) a growing number of adoptable software packages for a variety of planning applications;
vii) growing use of computers in planning schools and therefore an availability of planners who feel comfortable in the use of computer technology;
viii) major advancements in techniques such as geo-processing, computer mapping and graphics, remote sensing and word processing; and
ix) a general awareness and acceptability of computer technology by politicians, managers and planners."[16]

3.4.2. The Relational Approach

There is more, however, to the storage/retrieval/manipulation component for data base development and applications activities in local government planning operations than the requirement or ability to retrieve particular information from an extensive library of data, useful as that is. The difference pertains to the manipulation function which, in essence, establishes the

distinction between a data bank and an information system. A data bank has been defined as a 'depository for individual facts' with data further defined as 'facts in isolation' (Rosove, 1967). Data, however, are not information and vice-versa. To be useful, data must be manipulated from their original state of facts, into more meaningful states of knowledge, namely information. In turn, information is refined by conscious selection and interpretation into even more meaningful states of knowledge, that is intelligence (Catanese, 1972).

To be able to manipulate data from their original state of facts into information therefore requires two additional features. First, the system should not only allow for frequent updating of data, but should also allow for the reclassification of material consistent with changing needs. Second, the system should allow for relevant, associated data to be retrieved for two or more topics in a way that is not readily possible if the source data remain in separate files or records. The term 'relational' sums up this possibility precisely. Information systems which are relational therefore are essentially management devices for storing, updating and retrieving data, and which can allow a variety of 'searches' of the data to be made (Bracken, 1981). In this regard, an illustration of the relational approach to development of an urban data base is well documented by Bohl (1978).

According to Evatt (1982), the distinguishing feature of the relational approach is that the data are presented to the user as tables rather than hierarchies or networks. The model is built on the concept of a relation, a mathematical term given to a special kind of table where the entities are homogeneous in the columns but not in the rows. Thus, the data are structured

in the form of tables consisting of columns and rows, with the rows corresponding to records, and the columns representing fields within the records. Hierarchies and networks can be represented in relational systems by using common values that establish links between relations.

Sandburg (1981) identifies five strong points of the relational data base model:

1) Relational data structures are easy to understand because most people have a common and intuitive idea of what a table is;
2) Tables provide increased data independence as compared to hierarchies and networks;
3) Relational operations are powerful yet easy to use;
4) The relational model has a sound theoretical foundation; and
5) The language of relational operations used for data access may also be extended and generalized to data definition, thereby allowing for common interaction among data base users, programmers and administrators.

In short, relational data base systems present the user with a simple, high-level data base processing capability.

3.4.3. Integrated Information Systems

Since data requirements for planning are many and diverse, and quite often necessitate the use of more than one data acquisition method (including the acquisition of secondary data from other sources), recent experience has moved more and more towards the integration of various data sets. That is, as a result of associated costs in acquiring and maintaining large volumes of data in combination with associated hardware/software costs for computing facilities and resources and, because of overlap in terms of data needs across various departments within municipal/regional agencies as a whole (including

the finance, social, public works, public utilities functions, etc., as well as planning), calls for such integration has recently been developing for the establishment of integrated information systems for use across numerous departments within a local government's jurisdiction (Kraemer and King, eds., 1980).

Dueker (1980) has described the elements of an integrated information system in terms of four subsystems, identified as follows:

1. Management Subsystem - This subsystem is made up of the organization, staff, and procedures and rules for determining the direction of one or more of the other three subsystems. The management subsystem is largely noncomputerized; staff and procedures are available to facilitate access to the data base and other subsystems. The staff's major function is to translate user questions regarding retrieval queries and analysis tasks.

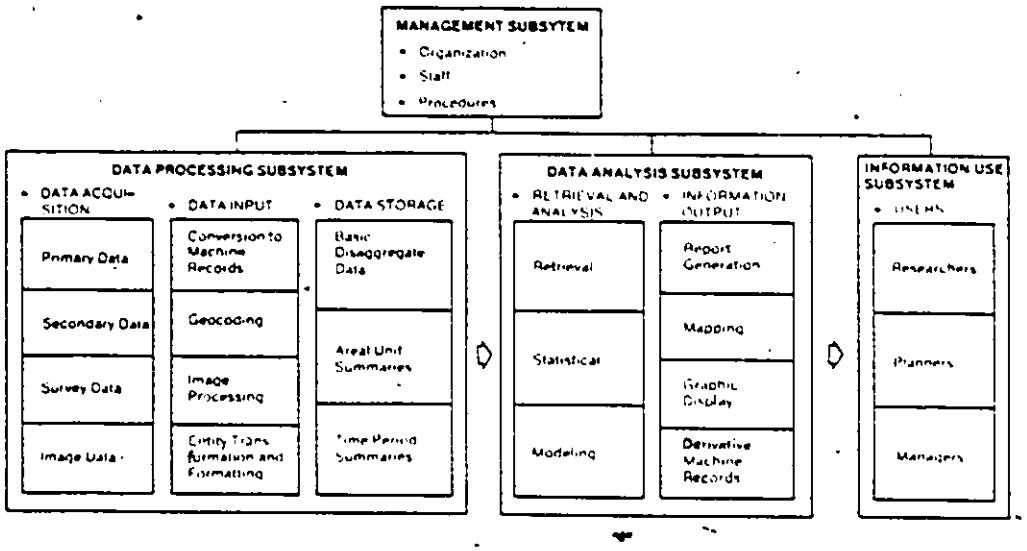
2. Data Processing Subsystem - This subsystem handles data acquisition, input, storage, and retrieval by means of a sequence of operations utilizing various automated and non-automated procedures. The data base (the major element of an information system) and the various data capture processes that generate the data base are found in this subsystem.

3. Data Analysis Subsystem - This subsystem handles such data manipulations as summarization, statistical analyses, or modelling. This subsystem also prepares data for output in various forms. The data analysis subsystem enables selective retrieval of data so that data analyses can be performed. These analyses range from the formatting of selected data in report form and the sophisticated modelling of urban systems using various policy options and map output to depict the spatial incidence of policy effects.

4.. Information Use Subsystem - This subsystem serves as the user's decision-making system where the information is brought to bear on a particular problem. Although the information use subsystem performs non-computerized activities, it is still considered a subsystem."[17]

Schematic representation of Dueker's information system subsystems have been reproduced here as Figure 3.4.1. As is evident, however, the system schematic is weak since it fails to provide for a feedback mechanism.

FIGURE 3.4.1.: Information System Subsystems

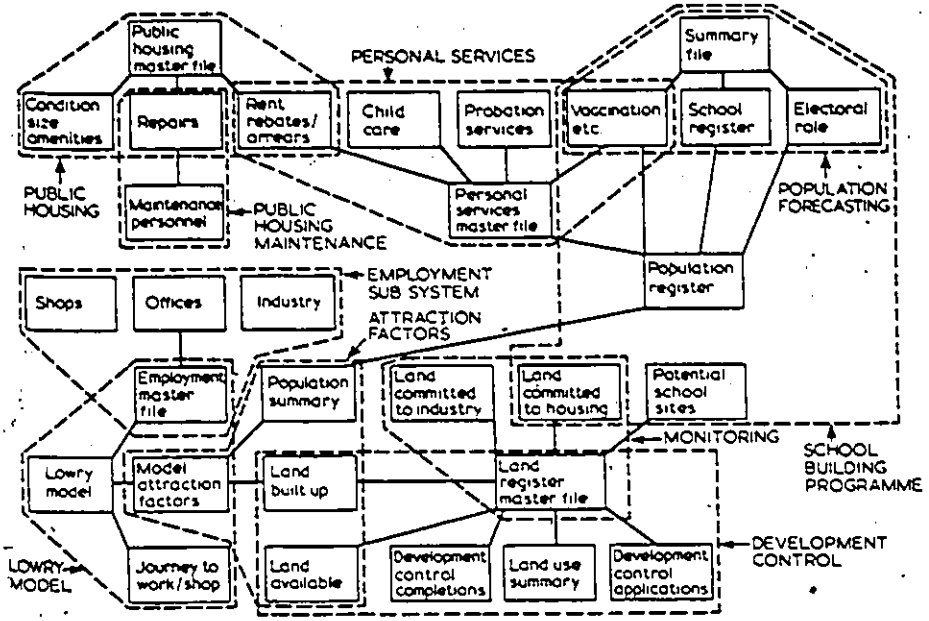


* Source: Dueker, K.J. (1980). "An Approach To Integrated Information Systems For Planning", in Computers In Local Government: Urban And Regional Planning, Auerback Publishers Inc., 2.1.2., Page 2.

For an integrated information system to be 'relational' such that data can be retrieved for two or more topics, what is required is cross-referencing of subsystems for basic disaggregate data within the data storage component of

the data processing subsystem. An example of an 'integrated/cross-referenced information system' in terms of schematic file representation has been identified by Willis (1974), as further illustrated by Baxter (1976). The example used is reproduced here as Figure 3.4.2.

Figure 3.4.2.: An Example Of An Integrated/Cross-Referenced Municipal Information System



* Source: Baxter, R.S. (1976). "Computer And Statistical Techniques For Planners", Methuen & Co. Ltd., London, Page 125.

In this example, each separate file has identifiers attached to the records which allow for cross-referencing. Masterfiles at key points in the system contain directories which permit the matching of these identifiers (Baxter, 1976).

As reported by Baxter (1976), such grand system designs have been established in Sweden since 1969. A consideration of greater importance, however, is than an information system should represent an image of the management system (institutional or agency function) it serves.

3.4.4. Data Base Management

Aside from available computer hardware and data, the extent to which the potential advantage of a computerized information system can be realized depends upon the ability of the supporting software to make the data it contains accessible. Without efficient software to perform essential data manipulation such as editing, updating, sorting, searching and aggregating, computerized data is less accessible than in the case of handwritten files. A critical area as far as integrated information systems are concerned, therefore, is the data base management system (Baxter, 1976).

The data base management system (DBMS) essentially attempts to remove the data handling operations from the casual user. Since reference to the detailed characteristics of DBMS is beyond the purview of this study, it is appropriate to note a major consideration: the difference between file and data organization. The file organization is the structure seen by the applications programmer, and pertains to how data files are read into the computer and whether or not they are stored on an intermediate device which necessitates some form of data organization. For integrated information systems, problems begin with the file organization where more than one file exists with some degree of cross-referencing, such that ordering is required to permit the structuring of data files with the removal of logical redundancies -- a process known as normalization. Data organization on the other hand pertains to

how data is processed and accessed; i.e. sequentially or non-sequential (random access). In brief, DBMS pertains to the data base organization perceived as a process of defining, representing, storing, and updating the data base.

3.4.5. Spatial Characteristics/Requirements

Since planning and required planning data have spatial qualities, it is essential that the storage/retrieval/manipulation component address this fact. In this regard, the recording of spatial location is desirable, as is the need for spatial processing facilities and resources. Essential to the recording of spatial location and subsequent spatial processing, however, is the establishment of suitable classification and coding systems, as previously discussed. Whereas classification is the grouping of like categories to help elucidate a particular problem, coding is simply a systematic method of labelling and recording the groups of data for processing purposes. In practice, both the classification and coding of data can be carried out as one operation.

Baxter (1976) identified three distinct components of relevence to classification and coding: entities, attributes and time. An entity is a uniquely identified observation i.e. a person, a building, a length of road, a census enumeration district, etc. The characteristics used to describe entities are called attributes. They naturally reflect the nature of the entity such that the spatial location of the entity could be one of the data values associated with an attribute. Not only is it possible to identify entities in space but it is also possible to reference them to a point, or points in time. The choice of attributes depends very much on the classification system in use which vary enormously in complexity, depending partly on the nature and availability of data, but primarily upon the requirements of the analysis.

Time series data are essential for analysis changes in the entities and attributes overtime. In order to address the spatial requirement, however, entities need to be classified into categories based upon their location in space expressed in terms of points, areas and networks (lines).

The simplest method for locating phenomena is by point location. For cases where a point is taken as the identifier of an areal parcel it is conventionally taken to be the visual centroid. For phenomena that can be referenced in this way it is a simple process to allocate a locational reference (or geocode) based upon cartesian coordinates (as an example, the Universal Transverse Mercator system is an established coordinate system wherein points in space are identified as x, y coordinates -- eastings and northings -- within a zonal system, based upon relative location to the poles and the equator). Point locations on the globe can be coded (identified) by either manual methods (such as by using a romer to read coordinates from a map) or computer-assisted methods (for example, using a digitizer) (Robinson, Sale and Morrison, 1978).

For information referenced to areal units there is a need to encode the spatial location of the areas. When these areas are regular (such as square grids) it is possible to assign a point location to each unit and to reconstruct the areal limits algorithmically. For irregular areal units, a point location at the centroid can be used to derive proximal maps with interpolated boundaries. Both regular and irregular areal units can be mapped onto a grid with implicit coordinates. For polygonal areas with known boundaries, their definition requires more information than a single point and it needs to be coded in a suitable form, that is, as a string of digital pairs for each vertex in an x, y coordinate system (Baxter, 1976).

Networks, on the other hand, are composed of links which meet at nodes. The links take the form of lines and can be viewed either as degenerate cases of polygons (i.e. a road network in which the width is ignored) or as boundaries between dissimilar regions (contour lines or geological boundaries). In both cases it is easy to hold the lines as segments, the spatial location of each end point being recorded. In the cases of branching networks (service systems, roads or natural drainage) reference must also be made to the connectivity. The method of storing network data reflects both the character of the network and the use to be made of it (Baxter, 1976).

The challenge to the use of point, areal and network (line) data, as per the discussion of integrated/cross-referenced information systems, is to integrate the different data structures into a systematic design that permits incremental adaptations. Under corporate management there is a clear role for management information systems and this implies a clear-sighted view of integrating disparate files where the system of spatial referencing is necessarily different. If this need for integration is realized at the outset it will influence the system design for files relevant to the separate local government functions by ensuring that the spatial characteristics of data are recorded.

Since any file of spatially located data is likely to be large in extent, it is desirable to partition it on the basis of areal domains in anticipation of the need to recover information subject to spatial criteria. Such a procedure is generally referred to as 'geocoding', which, according to Dueker (1977), is an activity that cuts across all sectors and enables planners to allocate resources spatially. Furthermore, geocoding is perceived as the single most unique offering urban and regional information systems can contribute to planning because of its capability to provide for the relating of

separately collected data by small areas.[18] The utility of geocoding, however, is consideraly reduced if data have not been recorded and stored at the smallest possible level before subsequent aggregation to the desired levels (Ontario Ministry of Municipal Affairs and Housing, 1982[b]).

One of the advantages accorded to spatially referenced information, therefore, is the ability to retrieve and analyse it subject to spatial criteria, a must for planning. The processing requirements for spatially referenced data can vary depending upon the specific requirements of each user agency, based on the distinction of three different categories. In the first instance there is the use of spatial attributes as a means to produce graphical display. Second, the spatial location may be used as a means of searching through a file, transforming spatially referenced data, or analysing spatial characteristics about the data. In the third case the conventions of spatial location can be used as a means of cross-referencing entities in an integrated information system (Baxter, 1976). The second category, namely, the searching, transformation and analysis of spatially referenced data involve procedures generally referred to as 'geoprocessing'. Identified methods for geoprocessing include point retrieval, rectangle search, polygon search, path search, area transformations and network analysis, as discussed by various authors (Baxter, 1976; Cooke, 1980; Kellerman, 1981; McNabb, 1982; Metzgar, 1980; Peuker, 1980; Ripley, 1981; and Switzer, 1980).

3.4.6. Statistical Processing/Analysis

Further to the manipulation function and the need for the ability to manipulate data from their original state of facts into information, is the ability to conduct statistical tests and statistical analysis. The ability to conduct statistical analysis is particularly acute for geoprocessing, and

underlies many data applications functions (to be briefly discussed in sub-section 3.6.) concerning forecasting (projection) or simulation (modelling) type studies. The use of computers for statistical analysis is particularly critical whenever large numbers of calculations are required, and circumstances do not lend themselves to manual calculations due to time constraints.

There are many texts available which present and discuss the role and nature of statistics for the social sciences in general (Johnson, 1976; Watson and McGraw, 1980). Baxter (1976) takes the discussion a couple of steps further, however, by devoting a full chapter to statistical techniques of particular relevance for planning, including discussions of the underlying mathematical constructs plus presentations of previously established computer programmes for each technique.

According to Bracken (1981), basic urban (statistical) analysis is normally undertaken in two stages. The first, description, concerns finding and measuring relationships among variables. The second stage is to establish dependency, that is, the extent to which change in one phenomena (variable) leads to changes in another, that is, as a distinct producer-product relationship. Basic statistical methods are therefore classified under two headings -- descriptive and inferential -- which must be distinguished from the more advanced classes of analytical inquiry for prediction, evaluation and impact assessment (to be discussed in sub-section 3.6.). The aim of the former (descriptive) is to succinctly and with validity provide unambiguous communication about some measured phenomenon. The latter (inferential) concerns the making of generalized inferences, usually from a representative set of data (a

sample), and hence will rely to a large extent upon probability theory in the form of statistical tests for significance. Where data are obtained by means of sampling it is vital that the concept of sampling error is understood, that the researcher is satisfied with the reliability of his data, and has full information about the scale of measurement.

A further basic concept is that of comparison in which the researcher delimits phenomena with significantly similar properties or, conversely, with significantly different properties. In both cases, the purpose of analysis is to express the comparison in a statistically valid and unambiguous way. Analysis of a singular variable as a parametric measure is referred to in general as univariate analysis. When analysis is undertaken in respect of two variables (and their data) a bi-variate analysis is involved, and when more than two variables are treated simultaneously the treatment accorded is a multivariate analysis. Recalling the distinction above between description and dependency, statistical methods can be readily classified, for example, according to the following general categories:

i) measures of association;
ii) measures of dependency;
iii) measures of inter-relationship; and
iv) measures of inter-dependency.[19]

A list of specific statistical techniques is included in Appendix A.1. (Section 7.0. on the questionnaire form).

Many, if not most of these statistical techniques, can be applied by computer via the Statistical Packages for the Social Sciences (SPSS) software. SPSS is an integrated system of programs for the analysis of statistical data,

and can tolerate a great deal of flexibility in the format of data. Essentially, it provides the user with a comprehensive set of procedures for data transformation and file manipulation, as well as a large number of statistical routines. In addition to the usual descriptive statistics, frequency distributions and cross-tabulations, SPSS contains procedures for simple correlation (for both ordinal and interval data), partial correlation, multiple regression, factor analysis, and Guttman scaling. The data management facilities can be used to modify a file of data permanently, and can also be used in conjunction with any of the statistical procedures. SPSS facilities enable users to generate variable transformations, to recode variables, sample, select, or weight specified cases, and to add to or alter the data or the file-defining information. It further enables a researcher to perform analysis through the use of natural-language control statements (written primarily in Fortran with some input and output routines in Assembler) and requires no programming experience on the part of the user (Nie, Bent and Hull, 1970).

Originally identified as a limitation to the use of SPSS was it's orientation to conventional batch processing, and its associated weakness in terms of interactive or conversational programs for statistical analysis through time-sharing systems. This original limitation, however, appears to have been rectified with the development of the SCSS Conversational System as an interactive, conversational, end-user oriented, integrated system for statistical analysis and data manipulation (Kraemer and King, 1980).

3.4.7. Visual Display

A final consideration for the storage/retrieval/manipulation component for data base development and applications activities concerns the need for the capability of providing data in a variety of tabular, graphic, geographic

and cartographic formats and display packages. As emphasized by Wellar (1982), in many instances planners need to present information in graphic and cartographic form in order to "get the message across" to politicians, managers and the public at large. That position is shared by Rystedt (1980) with his insistence that computer-assisted thematic mapping is one of the best tools available to bridge the gap between the professional planner and the citizen, despite the many current obstacles, as documented by Douglas and Boyle (1982).

In essence, the basis of computer-assisted thematic map production are the previously discussed entities of points, areas and networks, which may have a number of both qualitative and quantitative attributes associated with it. One of these attributes refers to the relative position in space. As such, a thematic map is based primarily on data which have to be geographically referenced (Rystedt, 1980).

An attribute can be a qualitative description (a parcel of land which can be described in terms of its land use), or a quantitative measure about a characteristic (the site area of a property). Distinction must therefore be provided between the attribute and the units in which it is measured. The unit of measurement will vary according to the nature of the entity and the use to which the information is to be put, with four types of measurement scales available -- nominal, ordinal, interval and ratio scales (Baxter, 1976). As emphasized by Rystedt, (1980), the activities involved in producing such thematic maps further require statistical techniques for preprocessing data, geographic referencing and specification of cartographic method (mapping display), and computer science produced software programming.

This is the area where computers in general, information systems, and computer-assisted graphics have their greatest potential and begin to assume great importance for planning. By way of illustration, they have the capability of allowing large bodies of data to be displayed in a form having immediate visual impact for ease of comprehension, and thereby assisting to convert unintelligible data into meaningful information (Baxter and Crowther, 1974). The preferred situation for the storage/retrieval/manipulation of data elements/items/formats therefore further requires that consideration be given to the establishment of information systems capable of a variety of tabular, graphic, geographic and cartographic displays for both spatial and aspatial data.

3.5. DATA DISSEMINATION CONSIDERATIONS

Data dissemination is concerned with the delivery of data elements/items/formats to users, where users are defined as researchers/analysts/planners at the local government level, and whose functions include applying the data elements/items/formats in the conduct of local area analysis. The dissemination component, as previously discussed, is heavily dependent upon the data elements/items/formats that are specified, acquired and stored/retrieved/manipulated. Further, what gets disseminated in terms of data contents, mediums and formats determines, impacts upon, or constrains the applications component in terms of what can be done, how it can be done and when it can be done.

Data dissemination activities, as precedents, must meet such criteria as timeliness, accuracy, consistency, reliability and compatibility. As such, steps must be taken to ensure that data elements/items/formats are

capable of satisfying a variety of local requirements: in terms of their data handling capabilties; their preferred data set contents, mediums and formats; and, their temporal needs, at a point in time and over time (Wellar, 1971)..

For the purposes of this discussion, there are three different levels of distinction associated with data dissemination activities:

1. Within an individual local government corporation (municipal or regional) to the various internal agencies/departments/divisions;
2. Within a network of local government jurisdictions across a regional area to the constituent jurisdictions (agencies/departments/divisions); and
3. From outside agencies, where outside agencies are meant to refer to federal, provincial and/or independent agencies as collectors/suppliers of 'secondary' data products and services, to an individual and/or network of local government jurisdictions.

3.5.1. Intra-Agency Data Dissemination

Where data dissemination activities occur within an individual local government jurisdiction (level "1"), the preferred situation is directly related and proportional to previously identified considerations for data specification, acquisition, and storage/retrieval/manipulation. Currently, situations exist where many agencies/departments/divisions within a local government jurisdiction have similar data needs, and engage in a great deal of unnecessary overlap and duplication of effort for data acquisition, storage/retieval/manipulation. Further, differentials often result since some agencies/departments/divisions are in a better position to satisfy their needs more so than others. Examples in this regard have been documented by Garcia (1978), as follows:

> "....analysis of all local processes revealed that in order for local government to function efficiently, effective managment of information transfer systems would be necessary. Without this, there accrues a distinct loss of productivity which is ultimately very costly. Evidence further revealed that most information resources in a city /county are housed in file cabinets and served by manual maintenance (with its inherent human error factor) and limited transferability, reducing productivity of the labour force by as much as 50%. In addition, this information is departmentalized, dispersed within departments, fragmented, duplicated within other departments, and when duplicated, the tendency is to individualize it or specialize it, thus limiting its use. In some instances, the same information was found to be duplicated in as many as four distinct areas. The result of uncovering these chief information transfer problems, was the identification of the need for a shared resource or data base."[20]

As noted by Wellar (1971), when an intra- or inter-departmental flow of data occurs, one person or department disseminates data and another agency acquires it. Hence acquisition and dissemination are essentially two sides of the same coin, but with a fundamental difference. Assuming that data acquisition and data storage/retrieval/manipulation considerations are addressed as previously identified (subsections 3.3. and 3.4.), data that are acquired would flow through a central processing unit similar to that put forward by Dueker (1980) as a subsystem of an integrated information system. Data dissemination, therefore, should preferably be the responsibility of the processing center since they are closest to the dissemination problems and are most aware of their operation's capabilities for getting data to the users (Wellar, 1971). As an example for the above, Ondrejas and Morath (1976) have documented the necessary in-house changes that were required in order to establish efficient and effective data dissemination flows with the development and establishment of an integrated municipal information system as part of the USAC effort.

Overall, where data elements/items/formats are specified, acquired, stored/retrieved/manipulated and disseminated through an integrated/cooperative effort resulting from corporate planning/ management procedures, the likelihood that data elements/items/formats can be disseminated more efficiently, effectively, and to the overall satisfaction of the users are greater, as are the chances for achieving data standardization and compatibility (Garcia, 1978).

3.5.2. Regional Data Dissemination

Where data dissemination activities occur within a network of local government jurisdictions across a regional area (level "2"), as with a collection or grouping of small to medium-sized local government jurisdictions, the preferred situation is again directly related and proportional to the previously identified considerations for data specification, acquisition, and storage/retrieval/manipulation. This point is best elaborated by reference to financing arrangements among groupings of jurisdictions.

Prior findings have identified that, in general, the principal source of revenue for Canadian local governments (municipal and regional) is, and has been, derived from property assessment and taxation (Tindal and Tindal, 1979). Total revenue and subsequent budget allocation therefore is directly related to, and affected by, the size of the population within the administrative boundaries of a local government jurisdiction. With varying population sizes and subsequent differences in revenue generation potential across adjacent municipalities, the differentials in terms of ability to satisfy data needs (acquisition, storage/retrieval/manipulation) can be even greater than across agencies/departments/divisions within an individual local government jurisdiction. Further, there may well be a great deal of overlap and

duplication of effort, particularly between regional authorities and constituent municipalities. As a result, at least in the United States, many cooperative initiatives for local government 'data sharing' have been embarked upon through the establishment of independent data centers as separate service bureaus, or through shared service concepts such as time-share arrangements (Garcia, 1978; Gilbert, 1981; Gilbert, 1982; Rejfek, 1978; and Swank, 1982).

An example in this regard has been identified for Lane County, Oregon, where a regional information system was established as one of the first successful cooperative local government data centers in the U.S. (Gilbert, 1981). The primary motivations for the partnership were identified as being economic in nature. In this situation, an independent data center was established as a collective effort, with an online directory to shared data (Gilbert, 1982). The results were such that many users gained access to needed information and computing facilities which would not have been economically feasible if each agency had attempted such an effort on their own. Further, participating agencies/departments were not responsible for the updating and maintenance of data or programs contributed by other agencies/departments (Gilbert, 1981). Essentially, the project was described as developing in response to the needs of multiple users which collect and maintain data that must be related to data from other departments and agencies. In addition, it provided a model of an organizational structure that facilitated data sharing by multiple users without sacrificing individual agency autonomy and control of information (Swank, 1982).

Whereas the above reports on cooperative efforts established through an independent data bureau, Rejfek (1978) documented the situation where cooperation was established through shared service arrangements. In that situation, agencies with access to underutilized computing facilities provided services

to neighboring local governments lacking their own mainframe equipment, through time-share arrangements. In similar fashion, Smith (1983) documented the case of Metropolitan Toronto which established a Map Data Centre to store and exchange the survey and mapping data generated by Metro Toronto departments as well as those of its six constituent municipalities. At the time of publication the system was intended to be the foundation for a 'region-wide' integrated urban information system. The Map Data Centre, therefore is presently intended to serve primarily as a data warehousing storage center whereby each department/constituent municipality has on-line access for updates and responsibility for its own mapping.

Overall, where data elements/items/formats are specified, acquired, stored/retrieved/manipulated and disseminated through a cooperative effort (via either the establishment of an independent data centre or through shared service arrangements), the higher the likelihood that data elements/items/formats can be disseminated more efficiently, effectively, and to the overall satisfaction of the users. In addition, the degree of cooperation attained determines in large measure the extent to which data standardization and compatibility will be achieved (Garcia, 1978).

3.5.3. National Data Dissemination

With regard to data dissemination activities involving outside agencies (federal, provincial and/or other independent sources) as collectors/suppliers of 'secondary' data products and services to an individual and/or network of local government jurisdictions (level "3"), the preferred situation is again directly related and proportional to the specification, acquisition, storage/retrieval/manipulation of data elements/items/formats. Of critical importance, as previously noted are the steps to be taken to ensure that data

elements/items/formats are capable of satisfying local requirements in the following illustrative respects: their data handling capabilities; their preferred data contents, mediums and formats; and their temporal needs at a point in time and over time.

A research project commissioned by the Canadian Council on Urban and Regional Research (Barcelo et al., 1971), produced the following finding about the urban information state of affairs in Canada:

> "....information collection was very costly although there were a diversity of sources and much duplication of effort in the collection of information; and, there were difficulties in the comparability of data overtime and between jurisdictions."[21]

The CCURR project findings at a general level were that a great deal of information was being collected by various agencies, with a substantial amount of overlap and duplication of effort: horizontally -- across various departments and divisions within a given agency --; horizontally -- across agencies within a given level of government --; and; vertically -- across the different governmental levels. The resulting study conclusions pointed towards the need for greater standardization efforts (as discussed previously in sub-section 3.1). Among the recommendations made was one calling for the establishment of a network and clearinghouse for information exchange (a series of clearinghouses connected to a central body), wherein clearinghouse services would be provided in each of the following areas: urban public works, urban transportation, urban planning and land use, and comprehensive municipal administration.

The functions of the proposed information exchange system were outlined as follows:

> ".... to lay the groundwork for a Canadian network and a clearinghouse for urban information exchange. In the opinion of the authors of this report the function of this clearinghouse would be:
>
> a) to serve as a point through which to reach information on urban information wherever it may be located in Canada, for access and delivery in the user's language whether the original be English or French;
> b) to facilitate and encourage the standardization of information gathering, processing and dissemination to meet the needs of Canadian users (i.e. local, provincial and federal);
> c) to serve as a focus and resource to aid regional groups, individual municipalities and special bodies to set up their own urban information networks and sub-networks; and
> d) to act as a link with urban information clearinghouses and exchange services outside Canada."[22]

The recommendations from the CCURR-commissioned study pertained primarily to the data dissemination function wherein data from all data producing sources would be gathered through the network and system of clearinghouses, each reporting through a central agency, so that all data could be classified, organized, processed and redistributed to the data users. The overriding theme behind their recommendations, as such, was unlimited, 'centralized' data sharing so that any or all data using agencies (local, provincial, federal and private) could have unlimited access to standarized, compatible data sets on a nation-wide basis.

Based on the above findings, the preferred situation for data dissemination activities therefore suggests the establishment of a nation-wide network and clearinghouse for information exchange, connected to a central body, in order to further data standardization and the compatibility of data sets on a national basis.

3.5.4. Data Centralization

Upon re-examination of the preceding discussion of the three levels (1,2,3) of data dissemination activities it is suggested that the proposal put forward in terms of the preferred situation are consistent and reasonable: that is, centralization of data storage, processing and dissemination activities for reasons of economy of scale and enhanced data standardization -- within local government jurisdications, across networks of local government jurisdictions, and throughout the nation as a whole. There are two further important considerations concerning such centralization activities however, identified as follows:

1. The acceptance of centralization activities and operations within the current administrative and political environments; and
2. Legislative requirements for data confidentiality.

3.5.4.1. Political/Administrative Acceptance

Horwood (1980) recently identified 'information as an independent force of change' as a pitfall for information systems development. His basis for making such a statement was predicated on the potential for competing decisions arising during policy-making processes whereby the availability of information to non-leaders allows them to challenge leaders.[23] Although Horwoods argument's were largely directed towards the potential for conflict between political and administrative leaders and the public in general, due to greater public access to information, the statement could further be transferred to relations between and among governments within and between levels. That is, due to a more "open" information relationship, governments would be in a better position to assess the impacts of other government policies as it affects their jurisdiction. A major challenge facing standardization efforts

in general, and the movement towards expanded data sharing efforts and centralization of data processing and dissemination activities, therefore, is the gaining of acceptance for such a situation within the context of existing political and administrative environments.

3.5.4.2. Data Confidentiality

With regard to data confidentiality, System Development Corporation (1968) offered the following remarks:

> "Planners need confidential data: .... Restrictive disclosure policies and procedures can inhibit the legitimate utilization of urban data. In principle, data must be maintained at their lowest level of aggregation. Important information can be lost if data are aggregated at too early a stage in the analysis. For example, new cross-tabulations later desired may not be possible if premature summarization takes place. Therefore, disclosure rules can unnecessarily prevent statistical research, thus, the rules may sometimes prevent the development of a computer program that would be written to permit certain studies not now possible without in any way increasing the chance of violating individual privacy. At the local level, urban and regional information systems are likely to find as many, if not more, restrictions imposed on data release arising from the administrative and political environment than from problems of individual privacy."[24]

The key point to be considered if data are to be of greatest utility for planning, therefore (as previously identified) is that data collection, storage and processing must be the smallest possible level of detail. Subsequent data release and data transfer, however, is inevitably tied to confidentiality restrictions which can seriously reduce the effectiveness of data sharing efforts, or acquisition through a central data depository. Planners making use of an information system must be aware of the problem of undue invasion of privacy or confidentiality violation since any data sharing is, in effect, a release of data. The major argument in favour of centralization of

data processing, and dissemination activities is, therefore, such that a central agency could provide better assurance of privacy/confidentiality even though planning data and planning systems are not concerned about nor structured towards providing information on individuals or corporations (System Development Corporation, 1968). A final consideration for data confidentiality therefore is that the designers of urban and regional information systems must develop procedures for data access control that strike a balance between user convenience or requirements on the one hand, and the rights of individuals and corporations to data privacy/confidentiality on the other.

3.6. DATA APPLICATIONS -- CONSIDERATIONS AND REQUIREMENTS

Data applications, the culmination of data base development and applications activities, is dependent upon the data elements/items/formats that are specified, acquired, stored/retrieved/manipulated and disseminated. The primary purpose of establishing an information system, however, is to use it, and as a result the data applications component should be cast within a leadership role, particularly during the conceptualization stage (Wellar, 1971).

3.6.1. Why Systematic Study, Research And Analysis?

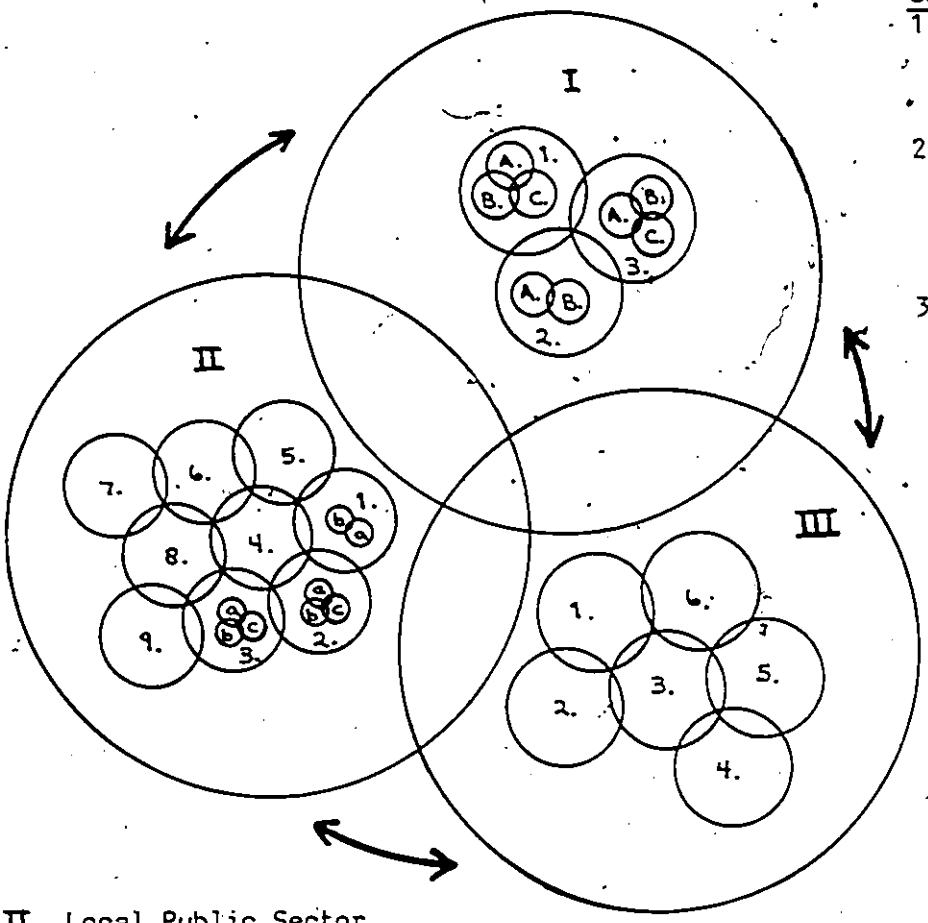
Attempts to fully specify and consider data applications for local government planning operations have continued to be plagued, however, by indecisiveness and debate over how planning activities should be conducted. That situation was discussed above (Part II) in terms of traditional planning thoughts and approaches, and whether planning should be primarily normative in character or whether it should include data applications, systematic study, research and analysis. The reaction by Webber (1965) to this debate was that ".... the inherent consequence of producing information is to influence actions; and, motivations aside, to say what is, and hence to effect what will

be is inseparable from saying what should be."[25] Further, according to Bracken (1981), systematic study, research and analysis, can make matters more explicit, can lead to understanding and can enhance the quality of judgements about the urban past, present and future.[26]

At the local level (urban, regional and/or rural community) there are a multitude of activities, events and influences constantly taking place, each in a continuous state of flux. Regardless of the nature or number of different government levels administering an area, it is in the local setting where human activities take place. In turn, it is the local government jurisdictions that are charged with the responsibility of providing basic services for the constituent populations. There are, however, many factors to be considered which impact upon and affect local areas in terms of how and where people live, work and play, as well as upon the ability of local government jurisdictions to provide services. Such factors may be regarded as the multi-dimensional inter-relationships within and across local areas, represented schematically, as an example, as Figure 3.6.1.

Although the field of 'social indicators' has yet to advance to any point of well-defined scientific clarity (Atkinson, 1982), general social conditions, from an objective standpoint, are perceived as being related to employment opportunities and earned income, family size, ethnic origin and education, etc., with access to employment opportunities further perceived to be related to levels of and access to education (Milbrath, 1982). Access to housing -- and in particular, private home ownership -- are additionally perceived to be related to employment opportunities, earned income, education, and the supply of affordable housing, with housing supply perceived to be

FIGURE 3.6.1.: GENERALIZED SCHEMATIC REPRESENTATION OF THE MULTI-DIMENSIONAL INTER-RELATIONSHIPS WITHIN AND ACROSS LOCAL AREAS



I Development Processes/ Labour Generating Economic Activities:
1. Primary Sector
   A. Agriculture
   B. Raw Materials
   C. Natural Resources
2. Secondary Sector
   A. Manufacturing Industries
   B. Construction Industries
3. Tertiary Sector
   A. Wholesale Trade
   B. Retail Trade
   C. Service Industries

II Local Public Sector Activities/Functions:
1. Public Security
   a) crime detection
   b) crime prevention
2. Hard Services
   a) sewer
   b) water
   c) hydro
3. Transportation
   a) transit
   b) roads
   c) bridges
4. Community Planning/Development
5. Parks and Recreation
6. Sanitation
7. Education
8. Public Health
9. Social-Assisted Housing
10. Welfare Assitance

III General Social Conditions
1. Employment Opportunities
2. Earned Income
3. Family Size
4. Education
5. Ethnic Origin
6. Housing

dependent in many instances upon housing demand, building material costs and availability, and available supply of land suitable for residential development.

The growth and supply of employment opportunities, on the other hand, are perceived to be related to development processes and labour generating economic activities in the primary, secondary and tertiary sectors (Isard, 1979). As examples, the growth and supply of tertiary sector activities such as retail trade are perceived to be related to population size and family income expenditures which, as noted above, are in turn reciprocally related to earned income, employment opportunities, education, family size, etc. The growth and expansion of secondary sector activities, such as manufacturing, are dependent upon the ability of the tertiary sector to market the products produced and all of its accompanying relationships. Further still, the locational criteria for secondary and tertiary (economic) activities requires consideration of the availability of raw materials, economies of scale, access to market areas, transportation costs, labour costs and supply, plus other considerations such as the availability of suitable and sufficient industrial and/or commercial space, the cost of municipal property taxes, and so on.

The ability of a local area (jurisdiction) to generate revenue through property assessment (as the principal means) and subsequently allocate/redistribute financial resources for public services (education, parks and recreation, public transit, sanitary sewers, water, roads, bridges, welfare-assistance and social-assisted housing, crime prevention/crime detection, etc.) are in turn related to such factors as property values, economic and industrial activities, population size, employment opportunies, income, and family size and composition. The greater the number of employment opportunities and

the higher the area wage rates, the greater the likelihood of population increases resulting from in-migration. The converse would be increased rates of outmigration resulting from loss of employment opportunities and increased unemployment rates. Higher rates of population expansion, on the other hand, have potential to stimulate greater demands for basic services like sewers, water, roads, transit, education, etc. Where in-migration exceeds employment expansion, or, where overall employment opportunities are contracting, the greater the likely demands for welfare assistance and social-assisted housing. Further, the greater the distinctness or separation of residential areas from employment generating areas (commercial/industrial), the greater the likely demands on the road and transit networks.

The 'domino-like' effects and impacts transmitted through such inter-relationships inevitably results in the requirements for political and administrative priorities to be set and decisions made, at the local level, with regards to the allocation/redistribution of local public resources. The allocational/redistributional aspects of public sector activities, however, have associated externalities -- positive and/or negative. The challenge for individual local jurisdictions, therefore, is in the proper identification and understanding of the nature and extent of both the underlying multi-dimensional inter-relationships (through scientifically approached research, analysis and systematic study) and the associated externalities for the choices made in terms of the policies, programs and projects that are established and pursued.

3.6.2. A Corporate/Strategic Approach To Local Government Planning

To meet this challenge, what is required is an evaluative framework which involves identifying as fully as possible the probable impacts of alternative plans and policies, assessing the relative importance of those impacts, and then relating them to resource needs, costs and availability over the period of the plan (Friend and Jessop, 1976). Tindal and Tindal (1979) identified a number of deficiencies of current (Canadian) municipal planning practise. Essentially, they advocated the need to broaden the scope of planning to embrace social and economic as well as land use considerations. This point was emphasized as being particulary important wherein Tindal and Tindal subsequently opened debate on the extent to which planning should be integrated with other activities of a local jurisdiction. Their arguments were extended as follows:

> "By its nature, it (planning) should provide a framework within which the various municipal services are delivered. The municipality's planning objectives should be reflected in the way in which financial and personnel resources are deployed. Yet too often it appears that municipal planning activities are one step removed from other council activities. The fact that a separate planning board or commission is usually established, the tendency for most municipalities to rely on outside consultants for the preparation of plans and implementing bylaws and the degree of influence and control over the process exercised by the provincial government all conspire to make planning seem less an integral part of councils activities than it should. While basic legal and structural changes are obviously desirable, it is also necessary to develop a management and decision-making process which more effectively integrates planning and other major municipal activities."[27]

Essential to such integration and the requirements for an evaluative framework, is the advancement of corporate planning as discussed in Part II.

Eddison (1975) identified three distinct processes required for the establishment of corporate planning initiatives in local government. The three processes, in this regard, are perceived as essential to the integration of planning with other major muncipal/regional functions and the subsequent establishment of an integrated information system* to serve the evaluative framework, identified as follows:

> "1. Strategic Planning -- which is the process of deciding on objectives of the organization, on changes in these objectives, on the resources used to attain these objectives, and on the policies that are to govern the acquisition, use and disposition of these resources;
>
> 2. Management Control -- which is the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives; and
>
> 3. Operational Control -- which is the process of assuring that specific tasks are carried out effectively and efficiently."[28]

Of critical importance to the data applications component, therefore, is the establishment of a suitable framework (to specify data applications through the strategic planning process, administer through the management control process, and carry-out through the operational control process) in order to maximize the full potential of a local authorities resources to achieve its desired ends.

* An information system is defined as a complex of people, equipment and processes interacting to provide information and intelligence from input data in decision-making (International City Management Association, 1979).

Underlying the strategic planning process, of which corporate planning is an element, are the PPBS set of procedures previously discussed in Part II (where PPBS includes 'management by objectives'). The general intent of PPBS is to make an organization more systematic and thus more efficient, and institute procedures for feedback and control by expressing concerns for:

Planning -- where planning is perceived as a co-ordinated set of future intentions both specific and generic in character;

Programming -- in the sense of both time and sets of decisions for action as a set of related future intentions in respect of certain specific situations which are anticipated in the future;

Budgeting -- as a plan of expenditure for resources of various kinds, particularly since there is no value in having a plan which is not realistic in budget terms or vice-versa; and,

The Systems Approach -- as a learning approach, where it concerns feedback and review, for the purpose of systematically increasing and improving the base of understanding plus aid in further refinement and re-establishment of the organizations objectives (Amos, 1973; Eddison, 1975; Friend and Jessop, 1977; and Roberts, 1974).

From the above, it is evident that the implementation of the PPBS set of procedures therefore requires a strategic planning framework be put in place for the following reasons:

1) to specify and define the overall corporate objectives as a plan of future intents;
2) to specify or program the strategy or means to pursue and systematically achieve such future intents;

3) to budget or establish financial priorities according to the programs specified; and
4) to keep abreast of changing conditions and establish an evaluative context for the results of the programs specified and implemented.

According to Baxter and Crowther (1974), planning as a more analytic and systematically based activity requires the continuous observation and examination of two types of events: first, the changes occurring in reality within the area for which a local authority is responsible (such as changes with regards to housing, education, employment); and, second, the decisions taken by the local authority itself or by other agencies (such as the higher levels of government, neighbouring local authorities, or private organizations). By these means, planners should therefore seek to:

1. Reveal and quantify problems requiring the attention of decision-making bodies within a local authority;
2. Provide the information on which decisions and the formulation of objectives can be based;
3. Assess the implications of policy proposals, particularly with regard to the way they affect each other;
4. Advise the relevant bodies (including external agencies where appropriate) of the likely consequences of their decisions and of possible conflicts or incompatibilites in their aims;
5. Assess the extent to which decisions and actions are producing the effects intended; and
6. Keep decision-making bodies up to date with what is happening in reality and with progress towards agreed objectives.[29]

The intent, therefore, is to provide a regular service to those involved in decision-making within a local authority, whether elected members or professional staff.

From this perspective planning should be more than the analysis of data; it should be the means whereby the local system adapts to changes in external factors, and respects the planning process. To be successful then, a planning system must therefore not only be interpreted as a framework for implementing plans, but as a means for facilitating re-adjustment and re-evaluation. Such re-adjustment and re-evaluation should be perceived as particularly acute at this point in time since planning activities have been evolving in Canada for the past sixty years or more, but not without their share of public and political criticism (Bryfogle and Krueger, eds., 1975).

According to Gannon (1977), planning and control are closely inter-twined such that you cannot have one (control) without the other (planning). Plans (strategic) provide the framework against which the control process works. On the other hand, feedback from the control phase (management and operational) often identifies the need for new plans or at least adjustments to existing ones (Kast and Rosenzweig, 1979). Planning further involves two key aspects: developing the goals an organization seeks to attain, and deciding on the means to achieve them. Means to achieve an objective, however, also takes two different forms: strategies and tactics. Strategies are the means to accomplish the overall objective or objectives of the organization. Tactics, on the other hand, are the means to attain specific objectives that relate directly to the overall objective or objectives (Gannon, 1977).

Burch and Strater (1973) have suggested a three-level classification for the types and sources of information required to facilitate the different organizational functions: strategic, tactical and technical.

"1. At the strategic level, long-range plans and policies are very important, external data are of prime significance. Decisions at this level tend to be more intuitive and less subject to predetermined decision rules.
2. Tactical decisions, as they pertain to management control, involve putting into effect the plans of strategic decision-makers and controlling the efforts of first-line supervisors and program managers. The objective of such decisions is to serve as the interface between strategic plans and the operational activities. To perform effectively, middle managers must rely more heavily on information generated within the organization.
3. Technical decisions, as they pertain to operational control, are primarily concerned with controlling the day-to-day operations. Internal information is more important to successful decision-making at this level, and the process is generally much more structured than at either of the other two levels. This greater degree of structure often allows many of the problems to be stated as mathematical relationships and to be solved in a predetermined manner through the use of standard operation research techniques."[30]

The PPBS framework therefore is primarily a means for establishing procedures for management planning and management control to better serve tactical decisions within the corporate planning process. The ultimate purpose, however is to then furnish the means and evaluative context for providing 'external' information for strategic planning and strategic decision-making via local area analysis.

Baxter and Crowther (1974) have identified three main areas where computer applications are relevant to planning and the furnishing of external information:

"1. in data handling (storage/retrieval/manipulation), including the output for visual (graphic and cartographic) presentation and display;
2. in the execution of analytical and forecasting studies; and
3. in the automation of routine procedures based on information flows."[31]

Apart from routine data collection, analysis and interpretation, local planning therefore requires both a 'prognostic' function (for example, the execution of impact assessment and forecasting studies to determine what is most likely to happen according to alternative assumptions), and a 'diagnostic' function (the evaluation of the effectiveness of policies after they have been implemented; the analysis of the causes of failure - where and when possible; and, the monitoring of policies, plans and programs as a near-time function, in order to keep in step with what and where activities are taking place in the local environment). The prognostic and diagnostic functions therefore serve as the mechanisms for initiating both feedforward and feedback control (Steiss, 1982).

3.6.3. Feed Forward Control: The Prognostic Function

In addition to the general tasks of data manipulation and presentation previously discussed (sub-section 3.4.), computerized data can be used for more rigorous, sophisticated purposes as inputs to a variety of analytical and forecasting programs to serve the prognostic function. Such programs could include 'modelling experiments' of various types (land use allocation models, fiscal impact assessment models, as examples) to assess the likely impact of alternative strategies. Essentially, impact assessments examine the extent to which either a program is capable of producing a change in the intended direction or to identify potential problems before they occur. Such assessment generally depends upon a clear definition of program goals and objectives and specification of criteria of success (the setting of predetermined standards) with which to measure progress towards those goals (Steiss, 1982; Wellar, 1981).

Forecasting studies could include population projections, economic activity projections and housing supply/demand projections to be used in the attempt to determine how alternative assumptions might effect the probable future demands for schools, residential/commercial/industrial land, public utilities and/or for other public services like sewers, water, roads and public transit. Appendix A.1., sections 8.1.0. to 8.3.0. list a variety of population, economic activity and housing projection (and simulation) techniques, plus spatial interaction/allocation models. Specific techniques to be applied, however, depend, in general, on the situation at hand, the availability of suitable data, and the human and technical resource availability. Conditional forecasting and impact assessment techniques, as discussed, are clearly relevant to the prognistic function in planning since they assist in exploring the range of options open to a local authority to assess the consequences of policy decisions, and provide advance warning of what is most likely to happen in the foreseeable future.

Although many prior attempts have revealed where forecasts have proven to be unreliable, many others have achieved varying degrees of success. The documentation of such efforts has established considerations to be kept in mind. Using population projection as an example in this regard, Blumenfeld (1983) has observed that:

> ".... a good understanding of an area's development potential, attention to long-term trends and extrapolation for no further than half the time a trend is observed, help produce good forecasts."[32]

On this same topic, Simmons (1981) commented that:

> "In general, simple projection models based on a small number of variables will do as well as more complex schemes. The accuracy of population estimates, of spatial units, of natural demographic projections, and local economic forecasts is more important than a fancy model... More accurate population forecasts must incorporate projections of the local economy.... The conclusions argue for simple projection models that incorporate the best of our knowledge about natural demographic trends and local economic development."[33]

Madden and Batey (1980) have in many respects extended the debate with their reference to population projections at the regional scale by inferring that individual (trend projection) techniques, no matter how sophisticated, are of little use unless they can be related within an integrated framework and adopted within an explicit forecasting methodology. For population forecasting to have value, then, further consideration of the demand and supply of employment are requirements, as are population, and demand and supply of employment (for housing demand and supply projections). In terms of an explicit forecasting methodology, emphasis was directed towards 'forecasts for decision-making' which take account of policy aspirations and which employ the use of feedback or iteration as a process view. The use of feedback, however, requires recalibration of the projection model if conditions identified through the monitoring function exceed or fail to meet the range of limits established in the forecast.

Such a forecasting methodology is necessary, as identified by Breheny and Roberts (1978), in order to avoid the pitfalls of the linear-deductive approach in which a one-way deduction is used to produce forecasts for a range of activities. In this regard, pitfalls consist of errors in the first stage which multiply through successive stages such that a 5% margin of error may eventually reach 50% proportions. This situation was initially identified by Alonso (1968) in his criticism of purely probabalistic models which proceeded by chains, and his further recommendations against the use of intercorrelated variables. Alonso was quick, however, to point out that the choice of method depends in part upon the quality of the data; that where data are very good, it is wasteful to use overly simplistic models; and, that for less than top quality data, the use of less sophisticated models is advised.[34]

3.6.4. Feedback Control: The Diagnostic Function

McLoughlin (1969) placed particular emphasis upon the requirements for 'understanding the needs, problems, issues and concerns in order to best formulate the objectives', and to provide greater clarity for the limited number of choices that can be made. The Ontario Ministry of Municipal Affairs and Housing (1982a) inferred, however, that the concept of defining objectives and some broad performance criteria and maintaining a course of development to achieve them through a feedback and control action process, are necessary but not sufficient. It is also important to understand the inter-relationship of various factors, and to have clearly defined criteria to reflect that understanding. Where a more analytically based and systematically defined planning process assumes further importance in this respect, therefore, is in relation to the previously identified diagnostic function. That is, a more analytically based and systematically defined planning process provides a means for the evaluation of the effectiveness of policies after they have been implemented, and a follow-up mechanism for keeping issues under observation.

Concerning the diagnostic function (as post de facto analysis), Floyd (1978) has drawn attention to the use of social area analysis as a method for determining the best indicators of socio-economic change. Social area analysis is, essentially, a method which makes use of multivariate statistical analysis -- notably factor analysis, principle components analysis and cluster analysis -- of census data for historical analysis of the socio-economic characteristics and trends of a defined area.

The application of shift-and-share analysis for economic activity, as a further example, is a technique which can be used in an experimental approach. With shift-and-share, an analysis is undertaken to determine the extent to which the economic sectors in an area have grown or declined vis-a-vis rates of other regions or at the national level.

Further still, migration analysis could be conducted from one of two possible scientific approaches. The first is an econometric approach in which migration is regarded as the dependent variable, and is influenced by a variety of demographic, social and economic forces or factors. The second approach involves regression techniques used to estimate the influence of given variables upon migration without their detailed cross-classification. This approach provides a means for testing hypothesis about which factors are most strongly associated with the migration, either singularly or in combination (Bracken, 1981).

Monitoring, rapidly emerging as a distinct concept in the planning process (Bracken, 1981), is a remaining, important component of the diagnostic function. As a real-or near-time mechanism for tracking what is happening, where, in the local environment, monitoring as a distinct activity is designed to provide feedback should differences occur between what was planned and what actually happened. It is, essentially, an on-going informational activity and is an essential feature of any continuous, controlling process.

According to George (1977), monitoring enters at several phases in the planning process, regarding the identification and overview of the following:

1. public concerns and issues;
2. the validity of the strategy and assumptions of the plan;
3. the economic, social and physical environments; and
4. the output of each action program on performance objectives for that action program.[35]

In order to monitor changes and provide feedback for key policy assumptions, data should therefore be collected and analysed on a regular and consistent basis. The type and quantity of data required may vary from one local jurisdiction to another depending upon the nature of the key policy proposals and assumptions. The Ontario Ministry of Municipal Affairs and Housing (1982a) established, as an example, a broad list of the types of information for monitoring major policy areas. The list established has been reproduced here as Figure 3.6.2.

FIGURE 3.6.2.: POLICY AREAS AND GENERAL INFORMATION REQUIREMENTS FOR MUNICIPAL/REGIONAL MONITORING SYSTEMS*

Policy Areas	General Information Requirements
Employment and Industry	Total numbers and location of jobs by industrial/occupational categories; male and female employment rates; unemployment; industrial land availability and job densities; and the rate of attraction of new firms. Monitoring may also review the effectiveness of incentives and any policy changes of federal, provincial and regional bodies, (e.g. decisions on the future of airports, railroads, new towns, etc.)
Settlement Pattern and Housing	The calculations of housing requirements may have to be checked regularly in light of changes in the total population, age groups, household sizes, house completion rates, land availability, and the needs of the public and private sectors.
Transportation	The impact of traffic upon urban areas or the effects of improved facilities on the use of public transportation. The extent to which improvement of the roads, or the provision and management of parking facilities are meeting the needs of industry, commerce and the public.
Education, Social Services and Health	Statistical information regarding type, location and use of various facilities.
Shopping and Commerce	The estimates of expenditures in shops, annual turnover, floor space distribution, shop sizes, turnover/floorspace ratios, the impact of major developments inside and outside the municipality, shop vacancies, changes of use, and trends in office developments.
Sports, Recreation and Tourism	Review and monitoring of the provision of major sports facilities and sites for indoor and outdoor recreation, the growth in tourism and the adequacy of tourist facilities.
Minerals	Demands upon the mineral resources in light of production trends and government policies; the adquacy of reserves for meeting these demands based on the scale and quality of reserves allocated for extraction in the official plan; the impact of extraction on housing areas, the amount of land affected, the rates of extraction and restoration, and traffic generation.

FIGURE 3.6.2.: - Concluded	
Environmental Management	Impact or effect of developments on landscape quality in environmentally sensitive areas. Water quality, capacity and constraints of the land for sewage, refuse and waste disposal.
Agriculture	The quality of agricultural land used for development and reasons for development.

* Reproduced and Summarized from "Monitoring Guidelines: An Approach To Monitoring Official Plans", Ontario Ministry of Municipal Affairs And Housing, Toronto, 1982a, Pages 8-9.

A consideration of great importance to the success of a monitoring strategy is that a plan must be initially structured so that it is capable of being monitored. That is, it must be structured to permit or provide for identification and interpretation of change as a basis for review of policy. Typical areas for analysis and interpretation of change, as identified by the Ontario Ministry of Municipal Affairs and Housing (1982[a]), for example, are the following:

1. - changes in total population;
2. - employment conditions in major sectors and future prospects;
3. - industrial land requirements;
4. - residential land requirements;
5. - settlement and road pattern;
6. - education, social and health services;
7. - distribution of shopping in major shipping centres and core areas;
8. - sport, recreation and tourism facilities;
9. - mineral extraction
10. - preservation of prime agricultural lands; and
11. - protection of the environment.36

According to Bracken (1982), effective monitoring requires that three functions be fulfilled. First, there must be some clearly specified intentions set out by the plan or policy. Second, the circumstances which the plan or policy addresses must be capable of observation in some way; and third, there must be a facility for communicating information about the difference(s) between what is intended in the policy or plan and what is observed.

As a concise summary of considerations and requirements relevant to the data applications component where it concerns local government planning in general, and local area analysis in particular, Barras and Broadbent (1981) have developed a list of recommendations designed to establish stronger links with plan specification, policy formulation and testing, and strategy

generation, evaluation and review criteria. Although their recommendations were primarily intended for consideration in British structure (regional) planning, most if not all of them have direct relevance to local government planning (urban and regional) in Canada in the context of corporate planning and associated prognostic and diagnostic functions of data applications. Their recommendations were outlined as follows:

a) Plan objectives should be specific and operational, with quantified performance criteria where possible.
b) The need for priorities between objectives, issues and problems should be recognized, and the conflicts between alternative options highlighted.
c) From the outset, there should be a clear, overall appreciation of the total set of constraints operating on the Plan, including exogenous trends, resource availability, the limits of local authority powers and influence, and the extent and acceptance of existing planning commitments.
d) The supporting analysis should be used to amplify why certain issues are chosen as the most important, and to explore the inter-relationships between these issues.
e) Policy options should be formulated with reference to the defined set of Plan constraints, so that the limits of resource availability are fully taken into account, but at the same time the full potential for local authority action is realised.
f) Distinctions should be made between existing needs and future requirements caused by anticipated demographic, social and economic change.
g) Identification and assessment of the performance of past and present policies are required in order to provide valuable insights about future options.
h) Policy options covering the key issues of the Plan should be combined with the population and employment forecasts as the basis for stragegy generation. Their relative priority must be identified, and their potential effects upon future trends explored using the supporting analysis of system behaviour.

i) The changes envisaged in the distribution of activity should be justified with reference to the existing distributions, the capacity of infrastructure networks, the availability of development finance, and conditions in the land market.
j) There should be a critical examination of the extent to which existing planning permissions limit development strategies.
k) The relationship between land use and transport should be a central concern of strategy generation, which should further assist in the integration of policies.
l) The revenue and capital costs of strategies, in relation to the financial constraints on the local authority, must be taken into consideration throughout plan generation, evaluation and monitoring, distinguishing clearly between the costs of providing facilities for the existing population and for the anticipated population increase, under alternative policy assumptions.
m) For the generation and evaluation of alternative strategies, or the monitoring and review of existing strategies, attention must be paid to the distributional effects upon different social groups.[37]

3.7. INTER-MUNICIPAL/REGIONAL DATA COORDINATION

In conclusion, planning and control mechanisms, as they have evolved, have essentially attempted to provide a framework for the management of physical development. They have not necessarily, however, provided a means of either co-ordinating activities within local governments or between local governments (Ontario Economic Council, 1973).

Over the past couple of decades, for many areas a second local governmental level (regional) has been implemented as an upper-level mechanism for co-ordinating general development activities between lower-tier local governments. Theoretically, where two-tier local governments are in existence, lower tier plans should fit within the strategies of regional plans (Brown, 1974). Likewise, if and when such is the case, data needs and applications should be co-existent if not comparable. Corporate planning, as discussed,

has been developing in response to the need to co-ordinate activities within local government agencies. Other considerations which need to be addressed, therefore, through the corporate planning process at each local government level, are the functions and activities which could be further co-ordinated across the two local government levels.

Jackson and Wanio (1979) have suggested that the integration of the upper and lower tier (local government) planning functions permits duplication of data use. They have further identified that for lower tier municipalities, access to statistical information and information systems are potentially greater, if used, than would otherwise be available in the absence of (local) regional government systems. A starting point to better co-ordinate activities between local government levels, and to take advantage of potential resource benefits to be derived from (technical) economics of scale, therefore, are integration of the data base development and application activities.

To demonstrate where we are, at present, regarding data base development and application activities in relation to above discussions of the preferred situation, the following chapter seeks to identify and discuss the existing situation.

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PART IV: THE EXISTING SITUATION

4.0. INTRODUCTION

Part IV identifies the existing data situation, in terms of:

1. the contribution of Statistics Canada (products and services of the Census of Population and Housing), including the history of the census, census specification activities, data acquisition, data storage/retrieval/manipulation, data dissemination, and current developmental initiatives; and

2. Local Government Planning, including the use of computers, the use of census products and services, the application of analytical methods and techniques, and the status of corporate planning initiatives.

Discussions for Part IV report, therefore, on the findings for the above topic areas.

4.1. THE CENSUS CONTRIBUTION

4.1.1. Brief History

Canada has a long history of census-taking, dating back as early as 1666 when Jean Talon conducted the first census of the colony of New France. The modern-day 'nation-wide' census has, however, essentially evolved since enactment of the 1870 Census Act. In 1871, a temporary bureau was created to

conduct the census, the results of which were published in five bilingual volumes (in 1873). Further census-takings were then conducted as decennial efforts in the years 1881, 1891 and 1901 before the census office was made a permanent bureau of the Government of Canada (in 1905).

In 1918, seven years after the taking of the 1911 census, the Dominion Bureau of Statistics was created via the Statistics Act of that year, followed by the continued taking of the census as decennial efforts throughout the years of 1921, 1931, 1941 and 1951. Since 1951, the Census of Population and Housing has been conducted every five years.

With the new Statistics Act in 1971, the Dominion Bureau of Statistics was changed to Statistics Canada, complete with a revised mandate (Statistics Canada, 1976: Catalogue 99-940, Vol. Vi - Part 1). The general duties of Statistics Canada, as identified from the 1971 Statistics Act, were as follows:

> "(a) to collect, compile, analyse, abstract and publish statistical information relating to the commercial, industrial, financial, social, economic and general activities and condition of the people;
>
> (b) to collaborate with departments of government in the collection, compilation and publication of statistical information, including statistics derived from the activities of those departments (i.e. where departments are defined as any department, branch, bureau or other division of the Government of Canada or of the government of a province or any agency of either);

(c) to take the census of population of Canada and the census of agriculture of Canada as provided in the Act;

(d) to promote the avoidance of duplication in the information collected by departments of government; and

(e) generally, to promote and develop integrated social and economic statistics pertaining to the whole of Canada and to each of the provinces there of and to coordinate plans for the integration of such statistics."[1]

4.1.2. Specification Activities

Under the BNA Act of 1867, the legal "raison d'être" for the census was to determine representation in the House of Commons. This primary purpose remained with the Statistics Act of 1971, as evidenced from the following:

> "The census of population shall be taken in such a manner as to ensure that counts of the population are provided for each federal electoral district of Canada, as constituted at the time of each census of population."[2]

The census, however, has additionally served as the means for collecting and developing certain other specified information. As examples in this regard, the Official Languages Act requires that data on language (mother tongue) be collected to form the basis for the delineation of Bilingual Districts. Searches to provide proof of age are further done in accordance with the provisions of the War Veterans Allowance Act and the Old Age Pension Legislation. The Chief Statistician must additionally certify population estimates at regular intervals to meet the requirements of other federal government departments. The essential point being made is that there are legislative considerations which place requirements upon the specification component for the census.

The Census (of Population and Housing) has, in addition, throughout the years, further established a far wider range of uses and users than the determination of federal electoral representation. Apart from that basic requirement many individuals, communities, private industries, research groups, educational organizations, international agencies, and governments at all levels have been identified as utilizing census statistics to plan and develop their programmes. As a result, representatives at Statistics Canada (and previously the Dominion Bureau of Statistics) have, of late, made use of extensive 'pre-census planning initiatives' in an effort to more propitiously balance legislative requirements with overall user needs.[3]

Concentrated planning for the 1971 census, as an example, started as early as 1965. Two major planning elements were identified and executed as parallel and equally important partners in the census planning process:

1. A deliberate and orderly investigation of users' needs for census data; and

2. A programme to test various methods of collecting and processing the data.[4]

In essence, the two planning elements consisted of pilot studies, pretests and trial runs.

The result of such activities was the addition of a variety of new questions to the census-questionnaire form (on education, employment and income as a one-third sample for all households). Further introduced was the collection method of self-enumeration (to allow respondents to put down their own answers with sufficient lead time to look up details of which they are not sure and therefore ensure the establishment of more accurate information).

Planning for the 1981 census, on the other hand, began as early as 1974 with the establishment of a long range planning group. The primary objectives for the planning and development of 1981 census activities were identified as follows:

"1. To maintain the same quality level as obtained from the 1976 census in terms of coverage, data quality and timeliness of release;
2. To reduce respondent burden while at the same time meet the data needs of the major user sector;
3. To consult intensively with the major users i.e. federal departments, provincial governments, municipal governments and the private sector;
4. To develop content and size alternatives (of the census) as specific options for the Government; and
5. To reduce costs to minimum, while bearing in mind the attempt to meet other objectives of content, quality and timeliness."[5]

A constraint on the planning initiatives for the 1981 census, as identified by Bright and Pryor (1982), was the necessity of retaining, where feasible, all previously developed methodologies, technologies, and systems in order to reduce the risks and costs which might otherwise have been incurred by further innovations.

One outcome of the 1981 census pre-planning initiative was a major reduction of total census content: a twenty-five percent decrease from the 1971 census. Further, eighty percent of all Canadian households were required to complete a 'short-form' census questionnaire (a 12-question form covering such basics as age, sex, marital status, language and type of housing). The remaining twenty percent of all Canadian households (as a one-fifth sample) were, on the other hand, required to complete a longer questionnaire consisting of all questions from the 'short-form' questionnaire plus other topics such as education, migration, occupation and income, for a total of 46 questions (Bright and Pryor, 1982).

Specification activities for the Census of Population and Housing have evolved, therefore, to the situation where expressed feedback from major Census users receives more consideration then was given for earlier Census takings. Greatest priority, however, is forwarded to the requirements of federal legislation and departmental needs, and within the restrictions imposed by budget limitations discussed above.

4.1.3. Data Acquisition

For the 1981 census, three basic collection methodologies were employed:

"a) the traditional canvasser method in very remote areas;
b) a drop-off/pick-up approach for roughly 30% of the country's population in the more dispersed rural areas; and

c) a drop-off/mail-back approach for approximately 70% of the nations primarily urban population in communities of 10,000 population or more."[6]

In addition, an "early enumeration" of roughly 8,000 households (including some 40,000 to 45,000 people in areas of the far North and the Labrador Coast) were required. That is, enumeration in April and early May was identified as a necessity (for census purposes) before the people in question migrated to highly inaccesible areas during the latter part of May and early June, the regular census enumeration period.

Other relevant features of the data acquisition component were identified as follows:

a) the key personnel of the staff for the census are recruited from a standing and permanent census staff through-out the Ottawa-based headquarters and eight regional offices;
b) the approximately 34,000 Census Representatives (enumerators and field supervisors) were appointed by 1,911 Commissioners, who in-turn are appointed by the Minister (as per the requirements of the Statistics Act) and funded as a census expense; and
c) the eight Regional Offices had direct operational responsibility for the carrying out of the census within their respective regions, including the training of staff; although content, policy and funding were centralized decisions made in consultation with many bodies.[7]

Essentially, the funding, staffing and implementation of the census were carried out exclusively as a federal responsibility as established constitutionally and required via the Statistics Act.

In order to conduct the census (in terms of establishing areal units for enumeration area collection purposes) the use of maps form an integral component of the collection activities. Maps are essential to ensure that every part of the country is assigned for enumeration purposes, and that no area is counted more than once (Statistics Canada, 1982a). Canada is divided into 282 federal electoral districts which, for the purposes of the 1981 Census, were subdivided into Census Commissioner Districts and in turn into enumeration areas. The census commissioner maps are employed to keep track of the census enumerators. The census enumerators, on the other hand, use the enumeration maps to establish the households where census-questionnaires are to be delivered (and subsequently picked up, where applicable).

The enumeration area, therefore, is essentially a unit of work which reflects census methodology and the type of area to which the census representatives are assigned. For example, urban areas contain an average of 280 households, and rural areas 120 households. Large establishments (hotels, institutions, camps, etc.) are referred to as "collective" enumeration areas. As the smallest territorial unit covered by a Census Representative, enumeration areas must be consistent with the boundaries of all geostatistical areas for which statistical data are published (refer to discussion of data dissemination in sub-sub-section 4.1.5.).

The census mapping activities for collection purposes consist, primarily, of four main stages:

i) the delineation of enumeration areas and Census Commissionner districts;

ii) the field check of enumeration areas, conducted at a local level via the regional offices, including such activities as enumeration area (EA) familiarization and boundary checks, confirmation of the type of EA, enumeration procedures and the responsibilities of Census Representatives;

iii) the evaluation of field check returns and the finalization of enumeration areas; and

iv) the manual updating of base maps and the production of field materials.

Maps of the individual enumeration areas are derived from one of three sources, depending on whether the EA falls in a rural, small urban, or large urban area:

i) for rural remote areas base maps are accessed from the National Topographic Series (Energy, Mines and Resources) at scales of 1:50,000 and 1:250,000, with topographic features removed in order to highlight more pertinent information such as roads, railways, towns, villages, rivers, lakes, etc.;

ii) for small urban centres (less than 50,000 population) town plans and sketches obtained from municipalities are used (at a variety of map scales much larger than those for the rural series) as compilation for the drafting of base maps with further detail such as street patterns and street names; and

iii) for large urban centres (50,000 or more population) diagrams of individual census tracts are used as base documents, at large and varied scales, further showing street names and block numbers (Statistics Canada' 1982a).

Enumeration Areas, Census Subdivisions (a general term applying to municipalities, Indian Reserves, Indian Settlements and unorganized territories), and Federal Electoral District boundaries are displayed on all collection maps. Census Division boundaries (a general term applying to counties, regional districts, regional municipalities, and other similar entities defined by provincial authorities) are further displayed on all collection maps for rural and remote areas, and for small urban centres. Keeping the collection maps up-to-date therefore is a continuous but difficult process primarily resulting from municipal changes in terms of annexations, changes of name, dissolutions, changes of municipal status and incorporations; plus further complications resulting from the lack of comparability across municipal areas, the lack of stability, the lack of consistency, and the overall lack of municipal coverage in terms of Canada's total land area (Singh, 1982).

4.1.4. Data Storage/Retrieval/Manipulation

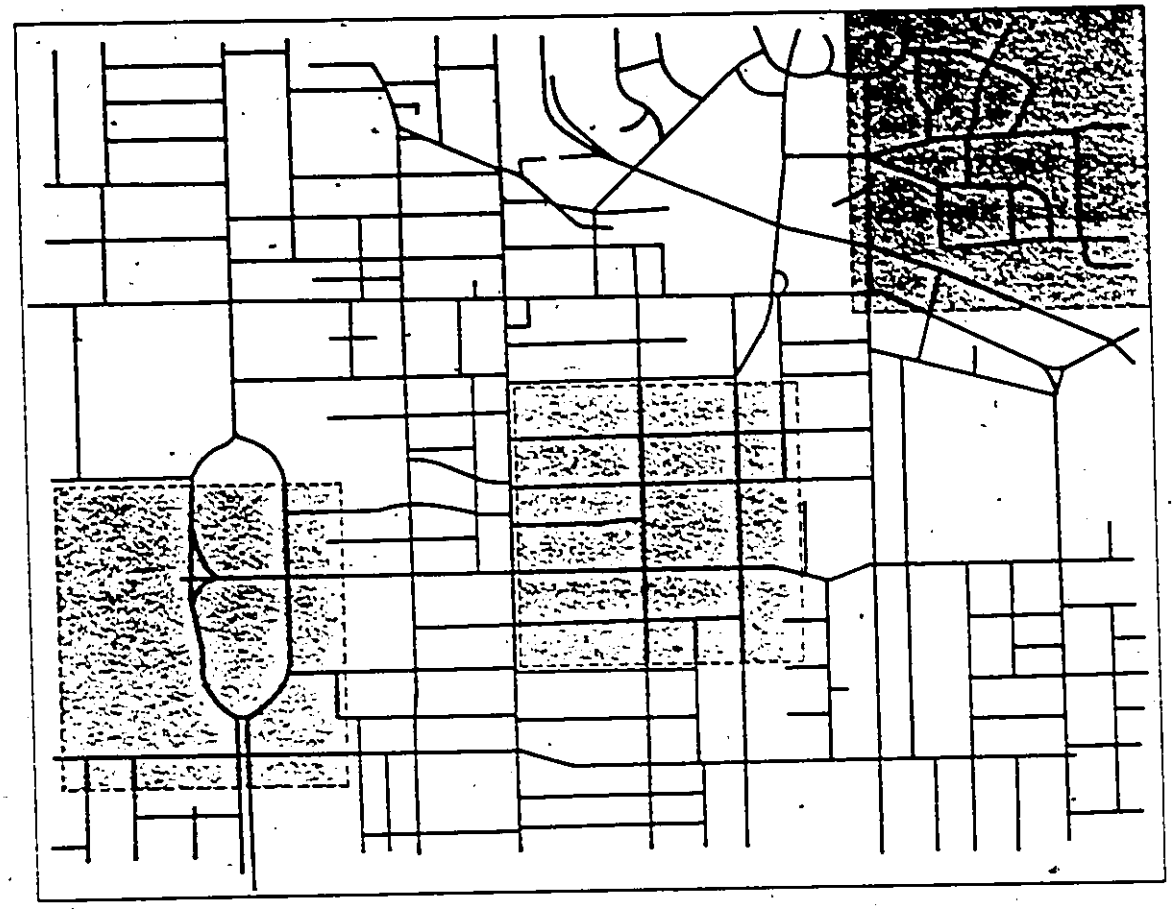
The basis of the data storage/retrieval/manipulation component for the census (in major urban areas only) is the Geographically Referenced Data Storage and Retrieval (GRDSR) system.[8] The GRDSR system makes use of the Universal Transverse Mercator (UTM) system to specify point-locations on the globe. Urban street 'block-faces' are used as the basic bulding blocks, where "block-face" means one side of a city street between consecutive intersections with other streets. Block faces are represented as segments between nodes whereby nodes are established at points where streets intersect or curve sharply in the city pattern. Every street is represented by a series of nodes connected by straight-line segments. Up to two block-faces can be formed by a

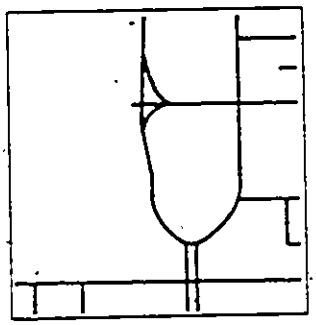
pair of adjacent nodes, each located at a four-way street intersection. However, a block-face can also encompass several nodes whereby intermediate nodes are established to indicate changes of direction between nodes at street intersections. Whenever a block-face is formed by a pair of nodes, the nodes must constitute the beginning and end of a valid civic address range.

In the GRDSR, all street addresses along a block-face are therefore assigned, and share, the coordinates of the block-face centroid, which is simply a reference point offset from the street midway between the two nodes forming the block-face (FIGURE 4.1.4.1.). During the conversion operation, the address of each record or data observation is matched to a block-face using a list of valid street names and address ranges. The actual geocoding operation (the assignment of coordinates to data) is carried out using GRDSR components known as Areas Master Files (AMF), which contain a logical representation of all city streets, plus other features, in computer-readable form (FIGURE 4.1.4.2.). An AMF references every street, address range, block-face and centroid coordinate in the covered area, plus other features such as railway tracks, rivers and municipal boundaries. During a geocoding operation, centroids are obtained by matching addresses against street names and address ranges within the AMF whereby address ranges can be thought of as representing the actual building blocks rather than block-faces. The AMF is therefore primarily a "network" geographic base file.

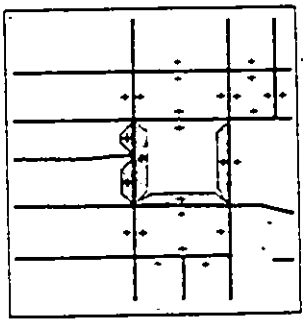
To initially link data to the geographic areas they represent, the data from the returned census questionnaire forms are read into computers via a Film Optical Sensing Device for Input to Computers (FOSDIC). FOSDIC cannot read the names of individuals, only the coded dots which have been filled in

FIGURE 4.1.4.1.: HOW BLOCK-FACES AND CENTROIDS (+) ARE CHOSEN

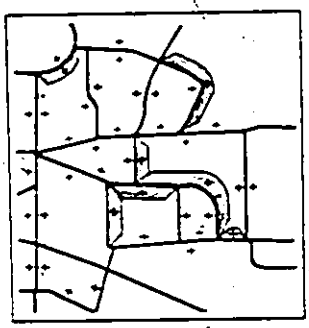




(1) STREETS THROUGH RECREATIONAL OR PARKLAND -- NO CENTROIDS



(2) STREETS IN REGULAR (GRID) PATTERN

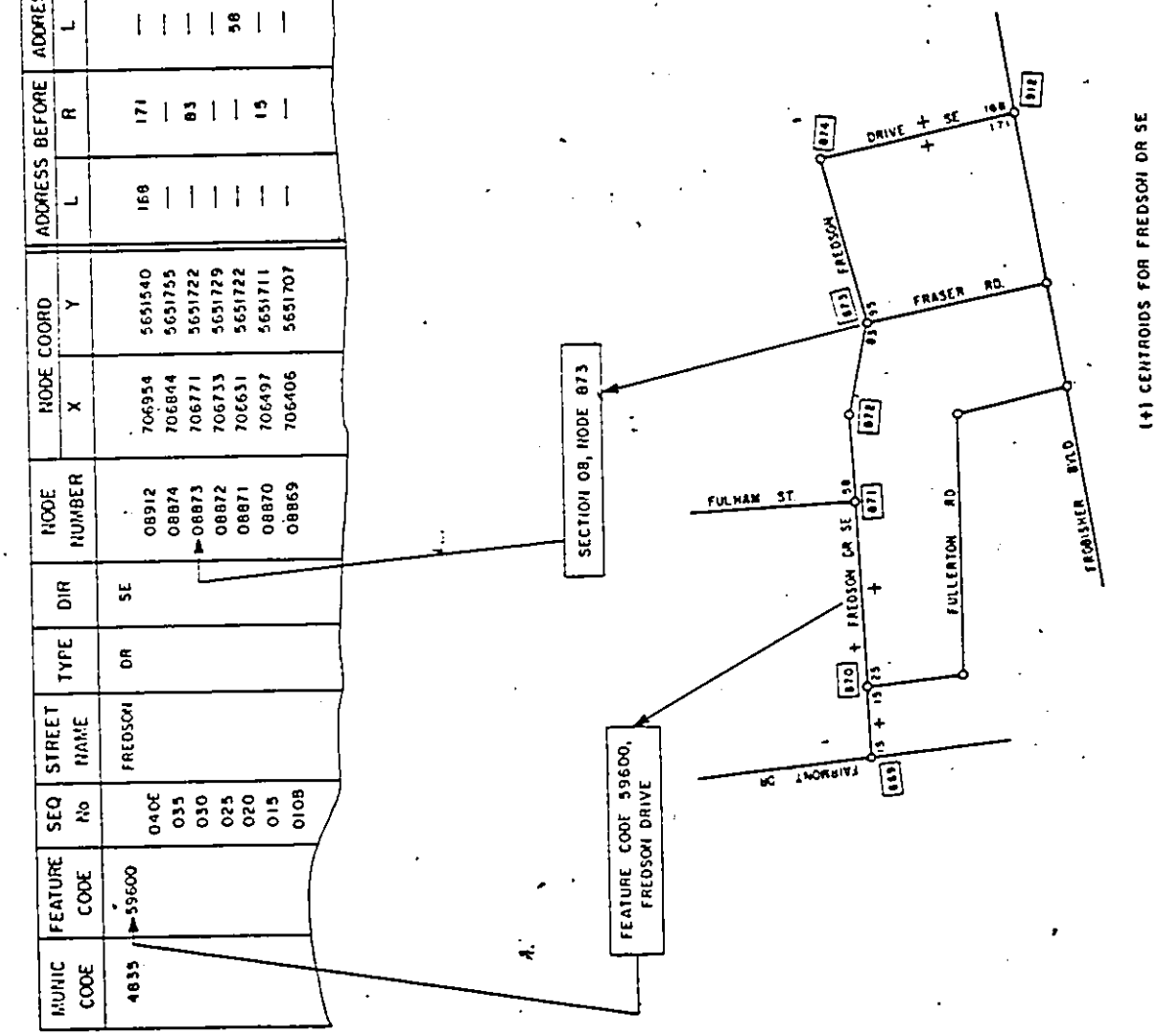


(3) STREETS IN IRREGULAR PATTERN

THE SHAPES OF SEVERAL BLOCK-FACES ARE SHOWN BY SHADED AREAS

FIGURE 4.1.4.2.: THE AREA MASTER FILE (SPECIAL FORMAT)

MUNIC CODE	FEATURE CODE	SEQ No	STREET NAME	TYPE	DIR	NODE NUMBER	NODE COORD X	NODE COORD Y	ADDRESS BEFORE L	ADDRESS BEFORE R	ADDRESS AFTER L	ADDRESS AFTER R	CENTROID LEFT X	CENTROID LEFT Y	CENTROID RIGHT X	CENTROID RIGHT Y	INTERSECTING FEATURES
4835	▶59600	040E	FREDSON	DR	SE	08912	706934	5651540	168	171	—	—	706868	5651755	706861	5651673	FROBISHER BY
		035				08874	706844	5651755	—	—	—	—	—	—	—	—	
		030				▶08873	706771	5651722	—	83	—	95	—	—	706635	5651700	FRASER RD
		025				08872	706733	5651729	—	—	—	—	—	—	—	—	
		020				08871	706631	5651722	—	—	58	—	706316	5651734	706452	5651687	FULHAM ST
		015				08870	706497	5651711	—	15	25	—	—	—	—	—	FULLERTON RD
		0108				08869	706406	5651707	—	—	15	—	—	—	—	—	FAIRMONT DR



on the questionnaires. Thus, while the census data itself deals with facts about individuals, the individuals remain anonymous within the framework of data storage and retrieval (Statistics Canada, 1976). Data from the census questionnaires are instead geographically referenced and assigned to geographic coordinates at the block-face level (based on civic address) where AMF's have been established.

AMF's, however, have currently only been established for municipal centres of 50,000 population or greater. For the remainder of Canada not covered at the block face level (urban and rural), census geocoding is carried out using standard enumeration areas with one centroid assigned to the approximate population centre of each. The primary difference, therefore, is the size of the areal unit in which data are stored, and the corresponding flexibility for user-specified data retrieval. Local areal units such as census tracts, electoral wards, city wards and other standard geographic codes are further excluded from the AMF. This means that such units are not constructed by aggregating AMF blockface centroids, but by the aggregation of enumeration area centroids, as discussed further on in sub-sub-section 4.1.5. AMF's therefore are independent from the census geography hierarchy.

With respect to actual file storage, instead of keeping all data characteristics (attributes) for a respondent together in one record, each data characteristic is handled separately. The entire set of responses for one data characteristic are assembled and stored as a continuous string, with one string created for each characteristic (such as age, sex, marital status, income or occupation). Data stored in this manner allows for flexible retrieval by specified areas, or for specified data characteristics. The

specified areal retrieval (geocoding) process therefore makes use of points, areas and lines, as previously discussed in part III; sub-section 3.4. Essentially, data is retrieved (via the software program STATPAK) by aggregating all specified data characteristics, for each and every centroid within a specifically defined geographic area, in tabular format.

For visual presentation, spatial distributions for a statistic (data characteristic) are displayed in map format via the MAPPAK program, whereby MAPPAK operates as an interface between STATPAK and SYMAP (a mapping program developed at the Labratory for Computer Graphics, Harward University). MAPPAK is also used to stratify data values into several classes or to filter a data characteristic. It incorporates all SYMAP facilities including contour mapping of surface data, classification of data values within arbitrary, predefined areas and summing the distribution of a set of data values. The results are displayed as numbers or as shaded areas on the paper surface (Statistics Canada, 1972[a]).

4.1.5. Data Dissemination

The data products disseminated from the census of population and housing represent a data base which includes over 150 variables (characteristics) describing Canadians, their families, households, and dwellings. A general list of many of the population and housing characteristics available from the 1981 Census are identified in FIGURE 4.1.5.1.

The census geography hierarchy is an integral component of the census data dissemination activities. The Geography Staff, Statistics Canada,

FIGURE 4.1.5.1.: DATA PRODUCTS - 1981 CENSUS OF CANADA (CENSUS OF POPULATION AND HOUSING)

Demographic:
- Age
- Sex
- Marital status
- Date of first marriage: age/date
- Fertility
- Mobility status
- Family status

Social/Cultural:
- Place of birth
- Immigration: age/date
- Citizenship
- Ethnicity
- Religion

Language:
- Mother tongue
- Home language
- Official language

Education:
- School attendance
- Highest grade
- Number of years
- Highest degree

Labour Characteristics:
- Place of work
- Industry
- Occupation
- Class of worker

Economic Activity:
- Labour force activity
- Weeks worked
- Hours worked

Income:
- Total income
- Wages and salaries
- Self employment
- Transfer payments

Private Occupied Dwellings:
- Structural type
- Period of construction
- Number of rooms/bathrooms
- Heating equipment
- Need of repairs
- Value
- Fuel used

Private Households:
- Tenure: owned/rented
- Length of occupancy
- Type of household: family/non-family
- Rent: cash/gross
- Rent to income ratio
- Owner's expenditures
- Crowding index
- Household income

Census Family:
- Type of family
- Number of children
- Family income
- Characteristics of family members

maintains a large number of standard geostatistical areas for tabulating and releasing census data. There are two primary types of geostatistical areas:

i) legal entities - which, for the most part, are defined by other authorities and respected by the census; and
ii) statistical areas - which are defined by the Geography Staff for the presentation of census products.

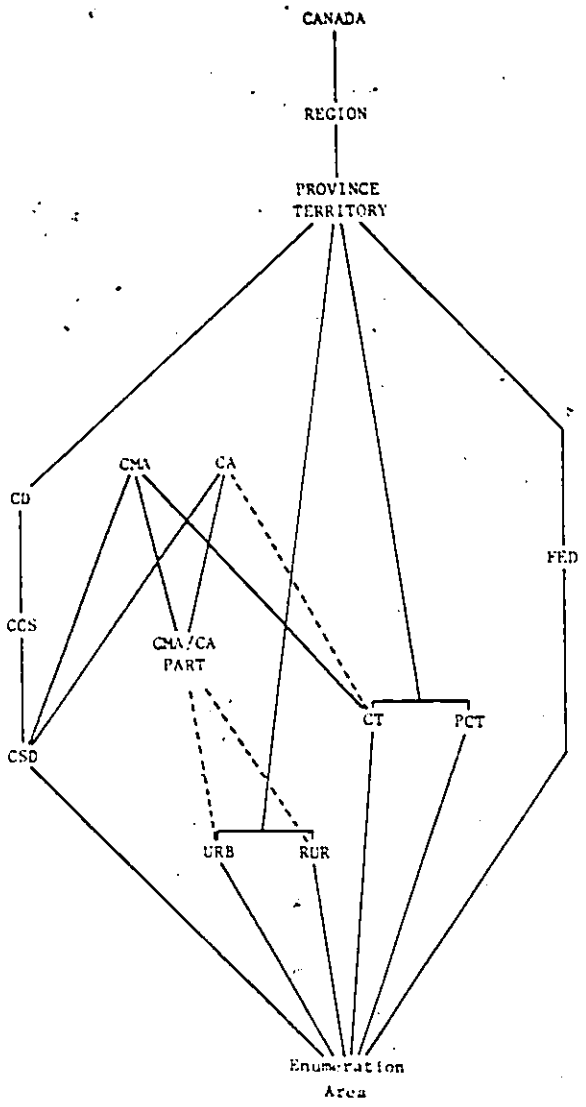
Enumeration Areas, as previously discussed, form the building blocks of all "geostatistical" areas and are normally the smallest geographic units for which census data are available. One exception of note is that basic population counts can be accessed to as low as the block-face level in major urban areas where AMF's have been established. The tabulation and/or release of census data are subject to the confidentiality restrictions of the Statistics Act, which means that no information can be disseminated in such a way as to identify an individual respondent.[9] A procedure known as random rounding, whereby tabulations for final digits are rounded either up to 5 or down to 0, are further applied to ensure maintenance of confidentiality restrictions.

Geostatistical areas are arranged in hierarchies, the main links of which are portrayed in Figure 4.1.5.2. Brief definitions for geostatistical areas are as follows:

1. Legal Entities:

i) the ten <u>provinces</u> form the major political divisions of Canada. They are the basic units for which census data are tabulated and cross-classified. The two <u>territories</u>

FIGURE 4.1.5.2.: CENSUS GEOSTATISTICAL AREAS



ABBREVIATIONS

CD Census Division
CCS Census Consolidated Subdivision
CSD Census Subdivision
CMA Census Metropolitan Area
CA Census Agglomeration
URB Urban Area
RUR Rural Area
CT Census Tract
PCT Provincial Census Tract
FED Federal Electoral District

* Reproduced From Statistics Canada (1982). "Geography And The 1981 Census Of Canada", Geography Division, No. 2 - GEO 82, Page 7.

(Yukon and the Northwest Territories) are treated as equivalents to the provinces in all census publications.

ii) A Federal Electoral District (FED) is any territorial unit entitled to return a member to serve in the House of Commons.

iii) A Census Division (CD) is a general term applying to counties, regional districts, regional municipalities, and other similar entities defined by provincial authorities. In Newfoundland, Manitoba, Saskatchewan and Alberta, the term describes areas that have been created by Statistics Canada in cooperation with the provinces as an equivalent for counties.

iv) A Census Subdivision (CSD) is a general term applying to municipalities, Indian Reserves, Indian Settlements and unorganized territories. In Newfoundland, Nova Scotia and British Columbia, the term also describes geo-statistical areas that have been created by Statistics Canada in cooperation with the provinces as an equivalent for municipalities. Municipalities are areas with corporate status governed by provincial and territorial acts. Indian Reserves are territories administered by the federal department of Indian Affairs and Northern Development.

2. Statistical Areas:

i) A region of Canada consists of one province or group of contiguous provinces. The ten provinces and two territories are regrouped into six regions: an Atlantic region; a Quebec region; an Ontario region; a Prairie region; a British Columbia region; and a Northern Territories region.

v) A Census Metropolitan Area (CMA) is the main labour market area of an urbanized core (or continuously built-up area) having 100,000 or more population, and contain whole municipalities (or census subdivisions).

vi) A Census Agglomeration (CA) is now defined as the main labour market area of an urbanized core having between 10,000 and 99,999 population. The only difference between CMA's and CA's is the size of the urbanized core.

vii) Census Tracts (CT's) are small areas (average population equal to 4,000) established within all CMA's and CA's which have a central city of 50,000 or more population at the previous census.

viii) Provincial Census Tracts (PCT's) are similar in concept to CT's (only with an average population of 5,000) and cover the rest of Canada not included in the CT program.

ix) The Census Consolidated Subdivision (CCS), introduced for the first time with the 1976 census, includes within one unit a geographically contiguous group of census subdivisions.

x) Urban Areas are areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre.

xi) Rural Areas continue to be defined as all territory lying outside urban areas.

xii) CMA's and CA's are further divided into three CMA/CA Parts: urbanized core, urban fringe, and rural fringe. The urbanized core is the continuous built-up area around which a CMA or CA is delineated, while the fringe consists of urban and rural areas lying outside the urbanized core but within the CMA or CA.[10]

A further integral component of census data dissemination activities are the various means and mediums for data output. Traditional census publications (ink-print) have provided a variety of statistical data for select subject matter and geographic needs; at both the national and local levels. Ink-print publications for the 1981 census have been briefly identified as follows:

1. The National Series - which consists of a series of tables for Canada and the provinces, which, individually, provide detailed distributions for all variables (data products) as well as highly cross-classified tables. This series, as indicated, has been designed for detailed analysis at the national level and provides time series data for comparison to previous censuses.
2. The Provincial Series - which consists of a series of publications (twelve sets of six publications) containing subprovincial data for each province and territory. A new series established for the 1981 census, this series provides geographic coverage which includes census divisions, census subdivisions, census metropolitan areas and census agglomerations. Subject-matter content of tables includes all variables, but generally in less detail than the National Series.

3. The Profile Series - which consist of a series of publications containing basic distributions for federal electoral districts, census divisions, census metropolitan areas, census sub-divisions of 5,000 population or better, and census tracts within the 36 census tracted CMA's and CA's.
4. An Analytical and Reference Series - which consists of a series of bulletins containing information of a descriptive nature on the products and services of the census i.e. explanatory guides and indexes (including reference maps for CD's, CSD's, EA's, etc.), a census dictionary, and description of quantitative measures of data quality and reliability, as examples. Further included is a Metropolitan Atlas series, as a series of bulletins, which employ 1981 census data to depict -- via thematic maps and graphics -- the distribution of various census characteristics for Canada's twelve largest metropolitan centres (as represented by the established CMA boundaries); plus a series of analytical studies (Content Series) which contain data on major social trends and characteristics (as indicated from 1981 census data). Each publication for the analytical studies includes data presented in the form of tables or charts and a description of the main characteristics and trends observed. Topics for the analytical studies include: Canada's population distribution; Canada's aged population; lone-parent families; non-family persons; language use; changes in incomes; trends in Canadian urbanisms; etc.[10]

In addition to the ink-print publications, all subject-matter content for the National, Provincial and Profile series', as well as an additional Special Series (for custom tabulations) are available via user summary tape or microfiche, in tabular format, and for both official languages. Census data in machine-readable form (user summary tape in combination with the AMF street index listing, as a geographic base file) provides for the establishment of independent, in-house data bases suited to a variety of specific application interests. Census data in machine-readable form can be manipulated by computer to extract geographic areas within an area of study that meets selected characteristics, calculate percentages and rank data, or aggregate small area data into municipal planning areas, traffic zones, health districts, school zones, etc. (Bright and Pryor, 1982).

Since data (by standard area) can only be released at the enumeration area level, as the smallest reporting unit (which can be highly unstable across census years), the geographic flexibility of establishing an in-house data base from census products and services, however, are considerably reduced. Even though Statistics Canada can establish and release data by user-specified areas, the users themselves (with their in-house facilities) are confined to those specified areas without the ability to re-manipulate to other, different specified areal units. In other words, the user with such an in-house data base derived from the census product can aggregate the standard or custom areal units to larger specified areal units, but cannot dissaggregate those reporting units to smaller geostatistical areas. Only Statistics Canada, internally, has that flexibility.

For those without computer facilities or expertise, similar arrangements can be made for access to summary data on tape at a private sector service bureau. In this regard, census data can be accessed directly by a service bureau via the CANSIM (Canadian Socio-Economic Information Management System) Cross-Classified machine-readable data base.

4.1.6. Current Developmental Initiatives

Of late, there have been a number of developmental initiatives taking place within Statistics Canada, several of which in particular relate directly to the Census. As identified from both published and unpublished sources, such initiatives primarily concern:

"1. Geographic Conversion; and
2. Computer-Assisted Mapping."[11]

The general thrust in terms of geographic conversion concerns current efforts to link the postal code system from Canada Post to the Area Master File (AMF). In this regard, efforts have been put forward to develop relational Data Base Management software for the intial purpose of assigning AMF centroids to six digit postal codes. As such, the postal code can be used as a geographic locator for storage and retrieval of census data.

The need for DBMS software arises from the potential for extending the AMF coverage to population centres as low as 10,000 to 15,000 (where door-to-door postal delivery exists) and to use the postal code master file (PCMF) to maintain a more current AMF file (by initating updates on the basis of the PCMF particularly since the PCMF is updated four times annually).[12] Furthermore, postal codes will additionally be linked to enumeration areas and subsequently all remaining geostatistical areas. This means that blockfaces and address ranges (where AMF's are established) will form the basic building blocks for all geostatistical areas, rather than the more aggregate enumeration areas as is currently done. All records (AMF and PCMF) will be identified to their respective municipality (Census Subdivision) via a Standard Geographic Classification code (SGC).

Long-term potential for the AMF/PCMF linkage file could further consist of the capture and release of annual data from administrative data files (for example, Revenue Canada Taxation or Social Security Files) to supplement the census. The impetus for data development of administrative files came from a 1979 (federal) Cabinet directive to examine the use of administrative data in conjunction with both censuses and surveys with a view to reducing the

1986 and subsequent quinquennial censuses. The impetus came, therefore, within the federal government, in response to data needs related to regional economic and social development. Data needs identified at the time included employment and unemployment data, family income data, population data, and data on small businesses.[13] The potential for such data development initiatives have been explored since 1979, however, whether or not those developmental activities will reach fruition and be integrated with the (federal) census into a single data system largely remains to be determined.

With regards to computer-assisted mapping, Statistics Canada has recently launched a series of programs investigating the use of automated mapping techniques to:

1. Reduce the costs of expensive and time-consuming manual drafting operations; and
2. Improve the consistency of map bases used for the collection, processing, and retrieval of census data (Yan and Bradley, 1983).

Essentially, current plans are to produce approximately 1200 collection maps (representing about 8000 enumeration areas) for the 1986 Census (Yan and Bradley, 1983). Collection maps, as noted in sub-section 4.1.3., are employed by Census Representatives during the census acquisition operations to ensure complete and unduplicated coverage of the entire land mass of Canada for questionnaire drop-off.

Results of the census findings must, however, be published. Therefore, reference maps are required to identify the boundaries of the various geographic areas at which census findings are released. As an alternative format

to the tabular display of data, results are additionally portrayed in thematic maps in the Census Metropolitan Altas series. Current plans are to produce computer-assisted census collection maps, reference maps and thematic maps via the machine-readable AMF by a program created to produce double-line street patterns from the AMF single line network (Bradley, 1983).

4.2. LOCAL GOVERNMENT PLANNING

The purpose of this sub-section is to briefly discuss the current state of affairs regarding the use of computers, the use of census products and services, the application of analytical methods and techniques, and corporate planning initiatives. The APPENDIX provides detailed findings from a questionnaire survey and follow up interviews. Findings in the APPENDIX are primarily concerned with: current products and services from the (federal) census of population and housing available from Statistics Canada; acquisition and use of (federal) census products and services at the local government level; perceived (federal) census shortcomings; and, application of analytical methods and techniques by local government planning agencies in the Ottawa-Hull area.

4.2.1. Use of Computers

The use of computers in planning in a North American context now has a history which spans three decades or more. Many early users were concerned with the interrelatedness of land use and transportation. In this regard, computers were initially regarded as useful tools for transportation studies due to the requirements for repetitive manipulation of increasingly large volumes of data via complex mathematical formulae. In Canada, the first major transportation study of this nature was the Metropolitan and Region Transportation Study initiated by the Province of Ontario. This study was conducted during the mid 1960's with the intent of projecting transportation requirements for the City of Toronto up to the year 2000.[15]

Many other users, particularly in the United States, were concerned with gaining advanced access to 1960 (U.S.) federal census of population and housing data via computer tape. At the time, there was no means or apparatus for the dissemination of census data from the new (computer) tape technology of the United States Census Bureau. Much of the interest which developed from early desires to access census data in machine-readable form eventually lead to the formation of the Urban and Regional Information Systems Association (URISA).[16]

As reported by Horwood (1977), URISA emerged from the general need for communication among professionals in a new field, and from their individual needs to learn skills, outlooks and philosophies that had not been included in their formal scholastic background. The approach which URISA assumed was both inter-disciplinary and multi-disciplinary, to meet the interest of its

founding members, and others from newly emerging graduate specialities such as public affairs, urban planning, regional planning and business administration.

Since its inception, members of URISA have reported on (via the annual URISA Conference Proceedings) how computer-assisted information systems have either contributed, or have potential to further contribute, in such areas as: organization and management, technical operations, data applications, modelling, geocoding, etc. Subject areas of concern have included physical planning, management and program development, census data manipulation and application, housing and transportation, data base management and so on.[17] Particular activities identified as having made use of computer-assisted information systems at the municipal/regional level have included transportation, engineering, environmental control, building inspection, land records, public utilities, finance, assessment, revenue collection, welfare, library, voter registration, police, fire, etc.[18]

For urban and regional planning in particular, a variety of different, commercially available software programs have been developed for various functional applications, based upon the following categories, as listed alphabetically:

- Census Data Manipulation;
- Community Analysis and Planning;
- Environmental Impact Assessment;
- Fiscal Impact Assessment;
- Forecasting (population and/or employment);
- Geographic Data Analysis/Geographic Information Systems;
- Land Use/Land Resources Planning;
- Mapping/Graphics;
- Statistical Analysis and Data Manipulation; and
- Transportation Planning.[19]

On the Canadian front, as identified through URISA proceedings and through the proceedings of the 1982 National Conference of the Canadian Institute of Planners (Wellar, ed., 1982), the use of computers in the planning domaine has rapidly expanded during the past decade. Such expansion, however, has primarily been confined to those municipal/regional agencies serving populations well in excess of 100,000. Prime examples in this regard include that documented for the Greater Vancouver Regional District (George, 1977, 1982a), the City of Edmonton (Guthrie, 1982; McMaster, 1980), the City of Calgary (Conway, 1980; McNabb, 1982; Somers, 1983), the City of Winnipeg (Courage and Leigh-Bennett, 1982; Courage, 1982; Leigh-Bennett, 1982), the City of Toronto (Chamberlain, Missirlis and Mitchell, 1980; Chamberlain, 1982; Mitchell, 1982), the Municipality of Metropolitan Toronto (Smith, 1983), and the City of Oshawa (Madziya, 1981; 1982; Madziya and Mokrzycki, 1982).

Brief examples of information system developments as identified from above mentioned documentation are as follows:

- The cities of Toronto, Calgary, Edmonton and Winnipeg, plus the Greater Vancouver Regional District, have developed and implemented geocoding-based municipal information systems by standard or special user-defined areas (via polygon overlay techniques) for multi-purpose land use/demographic description, analysis and projection.
- The city of Toronto has developed a Land Use and Proposed Development Information System (LUPDIS) for present and proposed land use, at the property parcel level.

- The city of Oshawa has developed a multi-purpose information system for community analysis, primarily from provincial assessment and federal census data, but further includes data derived from field surveys and other data generated through local administrative records (real estate branch, building branch, committee of adjustment, etc., including property based zoning designations).
- The city of Calgary has developed capabilities for computer-assisted mapping coincidental with spatial data and geographic referencing, suited to the redistricting of major data bases (and thereby maintain historical trends for a variety of different districts).
- The city of Winnipeg has used a central computer (mainframe) to combine a city assessment file with Statistics Canadas' Area Master File and census data to produce reports by standard or user-defined areas, plus further employed a micro computer in combination with the centralized mainframe to develop a building permits statistical system with on-line job submission.
- All local authorities identified above make use of (federal) census data (in machine-readable form) for demographic description and projection.

The Ontario Ministry of Municipal Affairs and Housing (1982b) recently conducted a survey of Ontario municipal and regional planning authorities in the attempt to establish a general overview of the present "state of the art" for the use of computers in planning. Only eighteen local authorities responded to their questionnaire, almost all of which contained resident populations in excess of 100,000. FIGURE 4.2.1.1 identifies the major highlights from their findings, in summary form. Included as respondents were the city of Ottawa and the Regional Municipality of Ottawa-Carleton which, as identified in subsection 3.1. of the APPENDIX, are the only planning authorities in the Ottawa-Hull area* with computer-assisted information system capabilities.

* A geographic definition for the Ottawa-Hull area is contained within the introduction of the attached APPENDIX.

FIGURE 4.2.1.1.: USE OF COMPUTERS IN PLANNING - MEDIUM SIZED TO LARGE ONTARIO MUNICIPALITIES (A SUMMARY)

Computer Hardware	- Planning department hardware needs are met via either a municipal mainframe (mainly located in the finance department), an independent service bureau, or through access to a university computer. - Of eighteen municipalities surveyed, three use micro computers and one a mini computer within their planning departments. The remainder have no independent computer facilities within their department. - Most municipalities have both on-line and batch mode operations, a minority depend primarily upon batch.
Computer Software	- Most software used in planning departments are either purchased commercially or custom-made by a consultant or a university. Other programs and packages are obtained from other municipalities where suited to their needs and available hardware. - Software packages in use were primarily employed for the storage and retrieval of planning data, manipulation and statistical analysis (mainly with SPSS software), demographic projection, and retail and transportation simulation. - Most municipalities have programming facilities available through their data processing centre. Very few have any programming capabilities within the planning department. - Mapping and graphics software are virtually unused. Further non-evident are software for Census Data Manipulation, Environmental Impact Assessment or Fiscal Impact Assessment.
Planning Applications	- Most common applications involve creation of Data Banks from assessment information. A number of municipalities have, however, combined assessment data with census data and in-house surveys. - Computers are little used for Plan Preparation and Policy Formulation, except in a few instances where computer-assisted analysis and modelling exercises have been utilized for background studies during Plan Preparation. - Use of computers in a batch mode and on a project basis for specific studies is common. On-line use for direct access and manipulation of data for operational or development control purposes is limited, although computer use for record-keeping and the generation of address labels to aid the development control process has been expanding. - Monitoring as a formalized activity is rare, computer-assisted or manually conducted.

FIGURE 4.2.1.1.: USE OF COMPUTERS IN PLANNING - MEDIUM SIZED TO LARGE ONTARIO MUNICIPALITIES (A SUMMARY) - Concluded	
Survey Conclusions	- In Ontario, the use of computers in planning is growing. Most municipalities surveyed anticipated future improvement of hardware, software and human skills. - Planning departments will continue to depend upon access to a larger mainframe located outside of the department, with increased use of micro computers as a supplement plus for on-line tasks, especially in medium sized municipalities. Data Banks constructed from assessment, census and information generated through in-house surveys and development control activities are expected to be a major thrust in the foreseeable future. - The continued shortage of adequate software (suitability, comparability and operational difficulties) will continue to limit improvement and advancement of computer use in planning for the present. The more sophisticated use of computers in modelling, mapping and geoprocessing are expected to remain limited to the larger municipalities and regional authorities, with indirect benefits accruing to area municipalities from such activities at the upper-tier level. - Resulting from ready savings (temporal and financial), the use of mini and micro computers for processing in zoning, subdivision control and word processing are expected to increase. - Advancement in the use of computers will occur at different rates resulting from the different needs and hardware/software resources across municipalities, however, all are expected to benefit from computer technology in the coming years through increased sharing of knowledge and experiences.

The existing situation for the use of computers in (local government) planning in Canada, although growing (as suggested from the Ontario Ministry of Municipal Affairs and Housing survey conclusions), is far from unified, common practise. To this point in time such use has remained confined to the more largely populated municipal/regional planning agencies. Since the aforementioned survey findings (FIGURE 4.2.1.1.) were derived primarily from planning agencies with jurisdiction over medium-sized to large municipal/regional agencies, it is therefore questionnable whether or not the use of computers in planning will (in the near term) expand to other smaller planning authorities currently lacking such resources. The findings from a questionnaire survey and follow-up interviews in the Ottawa-Hull area appear to dispute this notion (sub-section 4.2. of the APPENDIX). In this regard, planners at the municipal level serving populations less than 100,000,were less than enthusiastic or optimistic about the possibilities of using computers in their tasks. Limiting factors for this cause are as follows:

- lack of political and budgetary commitments which restricts the opportunity for obtaining computer hardware/software, and knowledgable personnel skilled in the use of computers in planning;
- lack of available or affordable software packages scaled down in size and suited to smaller municipal planning operations;
- apprehension and lack of willingness or desire by planners not well versed in computer technology, and as a caution towards unknown costs or benefits; and
- the negative attitudes and indifference of many planners to the need for and use of information system technology wherein many (but not all) perceive their functions as primarily normative and creative in nature rather than analytical or informative.

4.2.2. Use of Census Products and Services

Concerning the use of (federal) census products and services in local government planning, discussions of a more detailed nature are contained in sub-sections 3.1. through to 3.6. of the APPENDIX. In general, it could be stated that most local government planning departments use and value the data products from the (federal) Census of Population and Housing. Such a generalization is based on the findings reported in sub-section 3.1. of the APPENDIX, whereby an overwhelming majority of survey respondents indicated acquisition and use of census data variables. Such findings are consistent with the conclusions of other documented studies.[20]

Census use, however, is not well advanced for most planning agencies. The general, overall picture for census data acquisition and use is that (as further evident from sub-section 3.1. of the APPENDIX) most agencies are still dependent upon data acquisition by standard geographic areas and in pre-packaged tabular (ink-print publication) format, with census use primarily conducted by time-consuming manual methods. More extensive use is generally conducted by those with access to computer facilities.

As suggested by the Ontario Municipal Affairs and Housing (1982b) findings, however, not all planning departments with established information systems have the federal Census as part of their automated data base. In fact, virtually all of the respondents in the the Ontario Municipal Affairs and Housing study identified the provincial assessment as their primary data source. On the other hand, only 12 of the same 18 respondents identified the (federal) Census as a component of their automated data bank. As an example,

the Regional Municipality of Halton identified their computer files as consisting of assessment records, transportation, energy and environment survey results, council resolutions, library catalogue and development control information. Further, and importantly, assessment data were not, however, compatible with the (federal) Census![21]

In a recent (internal) report prepared within the Planning Department of the Regional Municipality of Ottawa-Carleton (Wright, 1982), specific reasons for lack of comparibility between Ontario assessment and (federal) Census data were outlined. Areas of non-compatibility were identified as follows:

> "The first difference between the sources of population information is in terms of the period and date of enumeration. The 1981 (federal) Census was taken on June 3 while the municipal population assessment refers to the period commencing on the Tuesday following the first Monday of September and ending on the 30th day of September as stated in Section 23 of the Assessment Act.
> The second difference - a major one - refers to the population base. The annual provincial assessment enumerates students (from outside of Canada or from somewhere else in Canada) and foreign residents (government representatives and members of the armed forces from another country and their families who are not citizens of Canada who reside in rental accomodation). The federal Census only enumerates the resident Canadian population, Canadian students are enumerated at their normal place of residents in Canada.
> The final reason for the differences between the two sources of information may in part be due to the new enumeration process adopted by the Province of Ontario in September of 1981. This new enumeration procedure results in a partial enumeration of the population in non-election years such as in 1981. The only segments of the population enumerated are:
> a) residential properties which underwent an ownership change; and
> b) multiple - residential dwellings defined as structures with seven or more residential units.

> This latter situation adds to the differences between the two sources making comparisons virtually impossible." (Wright, 1982)

Reasons why greater dependence is placed upon assessment data by local planning agencies with computer-assisted capabilities therefore are as follows:

i) a preference for more timely, frequent and up-to-date information;
ii) desires for data products which take account of all people resident in the area, regardless of their official place of residence as required for census purposes;
iii) desires for more detailed data dis-aggregate to the property parcel level (population and property characteristics); and
iv) desires for data more closely tied to and compatible with available land use data.

Other reasons might be attributed to the current lack of census data manipulation software (FIGURE 4.2.1.1.) for manipulation of (federal Census) user summary tapes, and costs for geocoding services (special geographic request areas) from Statistics Canada. In this regard, Ontario municipalities are provided with a provincial assessment (computer) tape for their area of jurisdiction free of charge, but must pay for Census products and services according to Statistics Canada's cost recovery program. No doubt as a result of such costs, relatively little overall acquisition or use is made of Statistics Canada services (User Summary Tapes, CANSIM, Area Master Files, Street Index, Custom Tabulations, Special Geographic Requests, etc.) by local planning agencies (shown by sub-section 3.1. of the APPENDIX).

The (federal) Census data variables which appear to be of particular interest in planning include: basic population and housing counts, demographic variables, labour force activity and labour characteristics, income (total, wages and salaries, and household), private occupied dwelling variables (structural type and period of construction), tenure, and census family variables. For such data variables, highest use is made of the Profile Series, as an ink-print publication. Geographic areas principally used, in descending order, are: Census Tracts; Census Metropolitan Areas/Census Agglomerations; Enumeration Areas; Census Subdivisions; Urban Areas; Census Divisions; and, CMA/CA Parts.

Sub-section 3.3. of the APPENDIX outlines a series of comments received concerning federal Census shortcomings (products and services) as perceived by local government planners. Sub-section 3.6., on the other hand, elaborates upon the results received where local government planners were requested to rate previously cited Census shortcomings. The attempt was to identify personal or individual criticisms or perceived Census limitations, for comparisons against grouped responses, that is, responses grouped according to nature or extent of planning jursidiction -- regional, urban or suburban-rural. Although many additional individual responses were received, only those ranked as serious by 50% or more of all respondents within each group were accepted as significant for the purposes of this study.

The results are reported in FIGURE 4.2.2.1 below, and, again in sub-section 3.6. of the APPENDIX.

FIGURE 4.2.2.1.: CENSUS SHORTCOMINGS

Regional Planners	i) length of time between census takings; and ii) high costs in purchasing data.
Urban Planners	i) length of time between the taking of the census and the reporting of census products; ii) problems for detailed information about small areas (i.e. reliability of data) resulting from random rounding; and iii) lack of information on land use within urban areas.
Suburban-rural Planners	i) length of time between census takings; ii) length of time between the taking of the census and the reporting of census products; iii) lack of comparability over time (with other census years); iv) problems created from changing geographic boundaries; and v) lack of geographic (small area) coverage for rural communities.

4.2.3. Application of Analytical Methods and Techniques

The application of scientifically based, analytical methods and techniques in local government planning is far from extensive. This statement is based primarily upon the survey findings documented throughout sub-sections 3.7. and 3.8. of the APPENDIX. As might have been expected, however, there are differentials across planning agencies. The most extensive use of statistical and planning-related methods and techniques generally resides in the larger urban and regional planning agencies with access to computing facilities. Many other agencies deficient in resources (financial, human and technical) generally make little or no use what-so-ever of such methods and techniques. Their operational limitations primarily confine them to the plans-administration function as required by provincial planning legislation.

Among agencies where analytical methods and techniques are applied, there appears to be little concensus as to which specific techniques are most appropriate. No techniques appear to be commonly applied on a regular or consistent basis, but generally are used on a project basis as the need arises. For many of the smaller agencies, lacking in resources, the requirement or demand for specific research or analysis is very often met through contracting out to consulting firms. Very little background analytical research for long range planning appears, therefore, to actually be performed "in-house". By way of illustration, research and analytical inputs to Official Plans, where applicable, are frequently produced by private consulting firms. Where that is the case there appears to be little, if any, follow-up in terms of evaluation or monitoring of proposals that are put into place. The greater range of methods and techniques used appears to be highly dependent, in most respects, upon political and budgetary commitments (including size and background of planning staff), and human and technological resource availability (including availability and knowledgable use of computing facilities).

The appropriate use or non-use of analytical methods and techniques is not, however, just a function of agency size. Many planners at the local government level question the relevancy and appropriateness of some of the more complex, sophisticated methods and techniques contained in the academic liturature. In addition, when such methods and techniques have been applied, difficulties have been experienced attempting to interpret the results in meaningful fashion. Finally, difficulties have been experienced attempting to convey findings to administrative and political decision-makers, who, in many respects, are mystified by both the methods and techniques per se, and their application. The end result appears to be continued adherence, therefore, to more simplified, traditional practices which are more readily understood at the operational, administrative and political levels.

As evident from the APPENDIX (sub-section 3.7.) statistical techniques, in general, appear to be both little understood and seldom used in local government planning. This statement is based upon the following findings:

- total number of respondents identifying use of statistical techniques, 15 percent;
- all statistical techniques listed were identified as too complicated or beyond the human and technical sophistication of the agencies in question, 22 percent;
- all statistical techniques listed were identified as innapropriate or irrelevant for the type of research or operational activities conducted, 45 percent; and
- all statistical techniques listed were identified as unknown, 33 percent.

The most commonly applied statistical techniques (and then only on an occasional basis) were frequency distributions, mean and median (measures of central tendency). As univariate analysis techniques, all are concerned only with the establishment of statistical descriptions.

The greater range of statistical techniques which are occasionally applied by the larger urban and regional planning agencies with access to computing facilities include the following:

- mode, and analysis of variation (univariate analysis);
- correlation, and regression (bivariate analysis);
- Pearson's r, and the percentage difference (measures of association);
- single group mean, and single group proportion (specific statistical tests); and
- multiple regression, and partial or step-wise regression (multivariate analysis techniques).

Further evident from the APPENDIX (sub-section 3.8), local government planners appear to be slightly more knowledgeable and accepting in the use of planning-related methods and techniques with a greater variety of use than that for statistical techniques (27.5% overall use). Such increased knowledge of and use, however, is still marginal (as a 12.5% overall increase). What is significant, but still far from substantial, is the greater range of methods and techniques more commonly applied. For example, planning-related methods and techniques identified as used, primarily on an occasional basis by 50% or more of all respondents, are as follows:

- trend extrapolation, and ratio techniques (population projection);
- headship rate model, and residential density model (housing simulation and/or projection); and
- integrated forecasting techniques where it includes population, employment and/or housing (land use projection).

Other planning-related methods and techniques identified as used (by greater than 10% but less than 50% of all respondents), primarily by the larger planning agencies and again on an occasional basis, are as follows:

- linear models, matrix methods (cohort-survival), and social area analysis (population simulation and/or projection);
- location quotient, economic base, multiplier/linkage-type analysis, and input-output analysis (economic activity simulation and/or projection);

- household distribution model, housing allocation model, and rent model (housing simulation and/or projection); and
- gravity models, intervening opportunities model, origin/destination analysis, traffic assignment models, trip distribution models, and trip generation models (spatial interaction/allocation models primarily for transportation simulation and/or projection).

From an overall point of view, there appears to be less attention paid to analytical inquiries related to the study of economic activity, that is, less attention than should be extended according to the open literature. As identified in sub-section 3.8 of the APPENDIX, three factors account in large part for the reasons why analytical inquiry is seldom involved in economic activity studies:

1. Lack of consideration or appreciation (by planners) for the impacts of the economic sector (economic activities) as it pertains to or affects local planning matters in general;
2. Lack of appropriate and usable economic activity related methods and techniques for local area analysis; and/or
3. Lack of appropriate economic activity data for local area analysis.

For these economic activity methods and techniques of analysis listed (see FIGURE 9 of the APPENDIX), respondents indicated their reasons for non-use as follows:

- innapropriate or irrelevant for the type of research or operational activities conducted, 52 percent;
- too complicated or beyond the human and technical sophistication of the agencies in question, 35 percent; and
- unknown, 13 percent.

Coincidental with these comments, planners responding to the questionnaire (sub-section 3.3. of the Appendix) identified a lack of economic data (geographic, sectoral and time series detail) as a major shortcoming of the (Federal) Census of Population and Housing. Further, in sub-section 3.5. of the APPENDIX other comments called for the integration of specific business data with (Census of Population and Housing) data. Since these comments were individually received and did not represent the comments made by the majority of all planners surveyed, all three factors listed above are, therefore, significant reasons why analytical inquiry is seldom involved in economic activity studies.

The general lack of presence of an analytical approach and the greater dependence upon intuition and subjective observation in local government planning is perhaps most evident where evaluation methods and techniques are concerned. As shown by FIGURE 11 (sub-section 3.8. of the APPENDIX) only judgement and ranking were identified as used by greater than 50% of all respondents. Other evaluation methods and techniques indicated as used (primarily on an occasional basis) by greater than 10% but less than 30% of all respondents included: cost - benefit analysis, goals achievement matrix, planning balance sheet, and critical path analysis.

In general, then, little attempt is made to quantitatively assess or evaluate the impacts, effects, or progress of planning proposals that are implemented. Reasons between, and the percentage for, non-use are as follows:

- too complicated or beyond the human and technical sophistication of the agencies in question, 50 percent;
- innappropriate or irrelevant for the type of research or operational activities conducted, 35 percent; and
- unknown, 15 percent.

More specifically, little emphasis is placed upon quantitative measures for evaluation because of difficulties deriving and interpreting economic and social benefits of various plans and policies in a statistical fashion (sub-sub-section 3.8.6. of the APPENDIX). Many local government planners believe that the benefits to be applied in using such techniques would be less than the costs required to apply them, particularly in light of the overriding political influence in local government planning decisions. A prime example in this regard is as follows:

> "Our evaluation of the various elements of the strategy is based on many judgements, tempered by analyses of research findings. But no rigorous mathematical evaluation technique is applied. We could discover very few evaluation criteria, apart from costs of hard services, that lend themselves to reliable statistical analysis" (Regional Municipality of Ottawa-Carleton, 1984).

4.2.4. Corporate Planning Initiatives

The introduction of corporate and strategic planning initiatives in local government appears to have only recently begun to emerge. Corporate planning as a distinct activity of Canadian local governments appears then, in general, to have been largely untested (except perhaps within some of the largest municipalities and regional authorities). As a result, documentation (in the open literature) of the impacts or results achieved through corporate planning initiatives by Canadian local governments is virtually non-existent.

One publication that has been released deals with the results from a pilot (experimental) project on local government management in general (MacDonald and Lawton, 1978). The Local Government Management Project (LGMP), as it was titled, was essentially a long term co-operative experimental project designed to research methods of improving management in local government.

Jointly sponsored by the Province of Ontario and four Ontario municipalities (the City of London, the City of Ottawa, the City of St. Catharines, and the Regional Municipality of Niagara), the project was designed, implemented, documented and evaluated by a Project Team from Queen's University (School of Business), and assisted by Project Leaders (internal facilitators) in each of the participating municipalities.

As emphasized within the Project Team documentation, one of the keys to local government management improvement is the capability of the particular municipality to function as a corporation, breaking down traditional functional departmental lines of authority. They implied that the program most applicable and appropriate to local government management improvement was one which a) acted to integrate departments in dealing with the broad based programs which municipalities must solve and, b) which helped administrators to develop mutual support services, common information technologies, and cooperative efforts to allocate resources and to provide recommendations to council.

Historically, municipalities have developed along departmental lines which has tended to produce a departmentalist philosophy in which each department runs its own affairs for its own benefit. The prevalence of this philosophy makes it difficult for a municipality to work as an integrated unit because each department is pre-occupied with meeting their own needs. Such a system does not allow the organization to cope with the sophisticated problems posed by today's municipal environment. Findings from the experimental project subsequently revealed the following:

> "The Team was successful in working with individual managers who showed initiative, but a basic problem was a lack of clear corporate direction and planning, and the lack of an integrating force for organizational decision-making."[22]

> "One example of the need for management improvement in local government is the general municipal response to financial restraints. The initial responses have often ignored any thought of trying to improve management. Usually programs are reduced, often with no sense of priority other than political persuasion. When top managers do attempt to improve the systems of management they all too often turn first to the introduction of complex ready-made techniques such as PPBS or MBO or, alternatively, to changes in organizational structure. Almost consistently, ready-made techniques, introduced hurriedly and without effective adaptation to the municipality, will fail. Managers frequently perceive such techniques as attempts to impose controls and more effort is spent in overcoming the controls than in using the techniques to operate more efficiently or effectively. Changes in structure on the other hand can only be effective where there is a clear understanding of the purpose, roles and goals of the organization and where the structure is specifically designed to facilitate goal accomplishment."[23]

Whereas the above findings primarily reflected the need for, but current lack of, corporate planning direction for mid-sized Ontario municipalities, a recent publication sponsored by the Federation of Canadian Municipalities has documented the situation Canada-wide for smaller municipalities (Wellar et al, 1982). In their report, they identified that good community planning required sufficient resources to do a proper job. In their survey findings, however, they found that, in general, a municipality's ability to afford planning resources, and the likelihood of efficient use of expensive personnel and data bases, are constrained by the size of the community. That is, the smaller the community, the fewer the planning resources that the municipality by itself is likely able to afford, and to employ effectively, even though these resources can be very useful in even the smallest communities. Furthermore, they were additionally able to detect a lack of specific development objectives and measurable targets in a number of important areas in small community development (employment, population, Main Street development, etc.) plus a similar

lack of studies or investigations supporting most small municipalities' Official Plans (similar to that previously identified and discussed here in sub-section 4.2.3. concerning the use of analytical methods and techniques).

Within the Ottawa-Hull area, only planners from the larger urban and regional agencies (the City of Ottawa and the Regional Municipality of Ottawa-Carleton planning departments) indicated perceived and/or impending movements towards the development and implementation of intra-agency corporate planning strategies (sub-sub-section 4.4.2. of the APPENDIX). The remaining, smaller planning agencies, in general, did not foresee the need for such a function particularly where it concerned a movement towards development of information system capabilities and subsequent application of analytical methods and techniques (as a regular departmental activity). Across agencies, even though networks exist wherein data and knowledge of existing data sources are discussed, virtually no consideration has been devoted to the potential for integratively establishing inter-agency strategies for the automation of information flows; that is, for the establishment of integrated information systems for access by all planning agencies in the regional area -- both regional and municipal. Such lack of consideration no doubt arises from the lack of financial resources, the general lack of interest, and desires to maintain independence.

As evident from prior discussions, there are many gaps and differences between the preferred and existing situations: in terms of the data base development activities of Statistics Canada, Census of Population and Housing; and, in terms of the data base development and application activities for planning at the local government level. As a lead-in to the prospective situation following, gaps and differences in this regard are summarized and discussed. Other discussions, of a supplementary nature, are provided for the purpose of identifying why further re-considerations of current data base development and application activities are required.

4.3. Notes/References

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PART V: THE PROSPECTIVE SITUATION

5.0. INTRODUCTION

The purpose of Part V is as follows:

1. To briefly summarize and discuss major gaps/differences between the preferred and existing situations, including supplementary discussions identifying why further re-consideration of current data base development and application activities is required;
2. To present selected recommendations (ideal/practical compromises) to Statistics Canada regarding investigative studies and developments of potential benefit to data standardization and local area needs; and
3. To present selected recommendations (ideal/practical comprises) to local government agencies regarding data base development and application activities of potential benefit to the corporate function in general, and community/regional planning function in particular.

5.1. ARE CURRENT DATA BASE DEVELOPMENT AND APPLICATION ACTIVITIES SUFFICIENT?

As demonstrated in previous sections, there is a considerable difference between the preferred and existing situations for data base development and application activities. Differences exist regarding the data base development activities at Statistics Canada (Census of Population and Housing) which have lead to gaps, that is, in terms of unfulfilled data needs at the local government level (see section 5.0. of the APPENDIX). Further differences exist regarding the data base development and application activities of local governments. A general summary of gaps/differences is presented in FIGURE 5.1.1.

FIGURE 5.1.1.: SUMMARY OF MAJOR GAPS/DIFFERENCES BETWEEN PREFERRED AND EXISTING SITUATIONS	
1. GAPS (data needs of local government planners):	i) more timely, frequent, spatially accurate and geographically detailed data concerning: - planning and local area analysis in general; - income, employment, and economic activity data in specific; - where new development and rapid population growth, or declines in population growth and economic activity are apparent (including suburban areas, small towns and rural communities). ii) greater comparability of (Census) data over time, with other data sources, and land statistics data for studies of changing land use characteristics in comparison with changing demographic trends. iii) reduced costs in acquiring (federal) Census products and services. iv) the development of historical profiles and generalized "indicator" series. v) additional software services (for amendments where changes have occurred for statistical reporting boundaries and for Census data manipulation), and scaled-down software capabilities (for compliance with smaller operational constraints and capacities).
2. DIFFERENCES (in planning practice):	i) growing knowledge of, and use of, computers in planning, but still primarily limited to the larger local government agencies (serving populations in excess of 100,000). ii) existence of negative perceptions by planners employed by local government agencies serving less populated areas (less than 100,000 population) regarding the potential for future use of computers in planning due to: - cautious, apprehensive, and negative attitudes of many planners towards the use of computers; and - resource limitations (financial, human, and technical). iii) existance of a general lack of corporate/strategic direction in local government, and limited use of analytical methods and techniques in planning to serve either the prognostic or diagnostic functions. iv) non-existance of a co-operative spirit across local government agencies in general, and planning departments in particular, regarding sharing arrangements for data and information system technologies and resources.

* Condensed and summarized from Part IV above, and the APPENDIX (particularly sub-section 5.0).

There are reasons, however, why the current situation has developed as it has. For example, (federal) Census of Population and Housing products and services are not produced for the primary purpose of satisfying the needs of local government. First to be satisfied are the federal legislative requirements and stipulations, and then as many other potential users as possible with federal users (political and administrative) topping the list of priorities. The (federal) Census has a long history which requires consistency (for historical analysis) but is tied to budget limitations which constrain the overall size, content, detail, and format of products and services to those areas of greatest overall priority and demand. Due to the vast geographic territory of Canada's total land area (in comparison to the relatively small extent that is actually urbanized) and the processing costs associated with developing large quantities of detailed statistical data, greater attention regarding detailed delineation and Census data collection have therefore traditionally been limited to the larger urban centers.

With regard to census geographic flexibility, Statistics Canada is not currently able to provide the more concise spatial delineation emphasized within the preferred situation, on a nation-wide basis. Even if it could establish such detailed delineation, the agency could not possibly maintain it without full support from the provinces and municipalities. At present, the provinces and municipalities are in a better position to specify, acquire, and maintain planning data at the property parcel level via land survey and assessment records. Statistics Canada, however, must depend primarily upon EMR maps produced via aerial photography and whatever assistance may be offered from the local level, which is where many spatial accuracy and subsequently spatial comparability problems begin. Furthermore, as a cost-reduction measure, not all Census data are collected on a full coverage basis. As a

result, larger geographic dissemination units are required to ensure statistical significance of sample data.

The situation for data base development and application activities in local government planning, on the other hand, is altogether different. At present, incorporated local government jurisdictions have been established for areas ranging in population size from 1,000 to over 2.0 million. Obviously the complexity and resulting needs for planning are going to be greater in the larger populated centers, as is the availability of financial, human and technical resources. Furthermore, political priorities at the local government level heavily influence the allocation of existing resources, which means that some local jurisdictions extend greater priority and subsequent resource allocation to the planning function than others.

With the evolution of planning practise in Canada (Part II) different perceptions of how local planning should be conducted have been adopted and adapted. Many planners developed a mistrust for (and subsequently maintained their distance from) computers and analytical methods and techniques due, in large part, to their association with the many large-scale and complex modelling and simulation-type experiments of the 1960's the results of which proved in most situations to be expensive and largely unsuccessful. When data needs at the local government level have been identified previously, in most instances the local agencies have turned to the Provinces for assistance. As a result, very few "additional" demands have been placed upon the (federal) Census of Population and Housing by local governments in general.

Many of the current attitudes, perceptions and practises for computer-assisted data base development and application activities appear, in many respects, to have prevailed from the major urban growth years of the 1960's. Such attitudes, perceptions and practices may require re-consideration, however, particularly in light of many recent publications which suggest the emergence of renewed rural and economic planning mentalities. For example, R. Parenteau (1979), concerning Canadian demographic and migratory changes between 1971 and 1976, recently identified an increase in the rural proportion of the total Canadian population. In his paper ("Is Canada Going Back To The Land?"), it was explained that such an increase represented an interruption in the tendency towards urbanization continually identified since 1871 the time of the first formal nation-wide census effort. Since 1976, as documented elsewhere, the rural population in Canada has grown by 8.9% as compared to the urban growth rate of 5%.[1]

Further declines in traditionally rapid urbanization trends, followed by expanded interest in Canada's small communities (in terms of demographic, social and economic change), could, if significant enough, place greater demands upon the information requirements and decision-making capabilities for such areas. A recent publication has already expressed concerns for the impact of exurbanite settlement on rural areas in general (McRae, 1981). Others have subsequently raised concerns about the information requirements for program monitoring and effective decision-making in small communities and rural areas (Quadeer, 1979; Wellar, 1984).

Of late, there have been many additional publications expressing concerns for other related areas, one of which involved the potential impacts from continued industrial decentralization out to more suburban areas. In this regard, concerns have primarily focussed upon the impact of such activities on surrounding rural land uses and land values, and the subsequent impact that rising rural land values may have upon farming activities (McCuaig and Manning, 1982). Additional concerns have considered the effects of such decentralization activities on central city economic decline, economic instability, limited population and employment growth in general, and the prospects for planning at the local governmental levels (Hutton, 1983).

Dueker (1982), in response to changing trends for the local economy across North America and the resulting impacts for planning practise, has identified some of the new requirements, expectations, and currently evolving adaptations regarding information system developments and applications. A short series of brief extractions from his writings in this regard are as follows:

> Requirements for information systems for planning and decision making are different now than in earlier periods. Information systems to support planning and decision making were introduced in the 1960's, a period when the societal context and issues related to public sector planning and decision making were those of growth and development. Currently the societal context for planning and decision making is considerably different. Rather than growth and development, the issues are stability, and often stagnation and decline in an era of inflation and resource constraints. This change poses different requirements for information systems and models for planning and decision making.

.... the societal context of the earlier era (1960-1975) was one of growth and development, within which a major issue was accomodating population growth, particularly the concentration of growth in urban areas. In the current era (1975-1985), we are facing stability of population in an inflationary economy, or "stagflation". The principle issue in the current era is one of dealing with fiscal constraints and attempting to achieve greater efficiency to cope with both inflation and shrinking resources. The management science/information systems developed during these two eras differ in approach. In the earlier era, the management information problem was assigning new resources; in the current era, the problem for management and information sciences is reallocating limited resources.

.... Another major difference between the two eras with respect to planning and decision making is that the analytical models used in the earlier era were ones that performed growth allocation and impact assessment for large projects, whereas in the current era there is more reliance upon models that assess fiscal impacts. This is so because the desired outputs of the planning process are different. In the earlier era the emphasis was on programming new infra-structure, and in the current era stress is on functions management to increase efficiency.

.... in the earlier era there was a broader scope for planning and decision making .... the current era uses a more focussed, ad hoc or fragmented approach, realizing that dealing with one issue may affect another, but recognizing also our limitations in dealing with either comprehensively.

.... In the earlier era there was little in the way of computerized bases available from operating agencies. In the current era, numerous operating agencies have computerized their data files and made them available for modelling, planning, and management activities. This link of planning to files of data used in government operations is essential, because planning applications alone cannot justify the expense of maintaining a large volume of transactions, as is the case in finance departments, or rapid query and response, as is the case in police and fire data systems. Increasingly, planning activities are dependent on machine-readable data from operating agencies."[2]

The scenario put forward by Dueker should raise a number of questions, particularly about the relevancy of many of the available analytical approaches (methods and techniques) identified throughout the literature. It should also raise many questions about available published data in relation to temporal and spatial needs, about current standardization efforts within and across governmental levels -- particularly as they affect data base development activities - and, about current approaches for management and planning activities by local governments in Canada.

Rather than place greater emphasis on information and intelligence derived from more rigorously defined analytical methods and techniques, local government planners appear to either prefer or be limited to the presentation of descriptive trends more readily understood by politicians and administrative superiors for further subjective assessment or evaluation. Monitoring as a distinct activity in planning, however, is rarely conducted on any formal basis in local government (Figure 4.2.1.1. plus sub-section 4.2. of the APPENDIX), even though many desires have been expressed for more timely and frequent statistical data. Although far from conclusive, such findings may suggest that monitoring activities are rarely conducted since more timely and frequent data are not readily available in any published, useable format.

Due to the influence that economic activities and development processes can effect to the local area environment, requests for more timely, frequent, and geographically detailed data of this nature are most prevalent. Due to current deficiencies associated with the acquisition of data that is spatially accurate and geographically distinct (which separates built-up areas from

non built-up areas) for small communities and rural areas in particular, further needs have been identified. Also identified were desires for comparable and compatible land statistics data in urban areas for studies of changing land use characteristics in comparison with changing demographic trends.

The single most important questions facing the prospective situation, however, are whether such data needs are common for local planning agencies across the country, and, if so, who, where and how should such needs be resolved? Comparison between the preferred and existing situations are therefore not entirely conclusive for the following reasons:

1. Data needs for the existing situation have been sampled from local government planners in the Ottawa-Hull area only, and therefore may not represent data needs as well as attitudes in other areas of the country;
2. There is insufficient evidence to suggest that the necessary support could be acquired for the establishment of the national data clearinghouse concept previously discussed (as evident from sub-sections 3.12 to 4.1 of the APPENDIX). Many local government planners could foresee benefits if all their data needs could be accessed through a national data clearinghouse. They were not, however, in accord over the human and technical feasibility of such an institutional arrangement to provide products and services satisfactory to their spatial and temporal needs; and
3. In many respects, local governments -- with assistance from their provinces -- are in a better position to satisfy many of their information requirements via self-help initiatives. Prime examples in this regard include where multi-purpose information systems have been developed in the more populated Canadian centres.

Due to the lack of conclusiveness, therefore, a limited number of recommendations involving compromises are offered.

5.2. PROSPECTIVE CONTRIBUTING ROLE FOR STATISTICS CANADA

The following recommendations to Statistics Canada are developed primarily from identified gaps, that is, in relation to local government (planning) data needs (FIGURE 5.1.1.). In this regard, the position taken is such that there are limitations to the use of the (federal) Census of Population and Housing which make it incapable of being employed as a primary source to satisfy all of these needs.

As observed, the identified data needs are varied and in some cases conflicting. For example, desires have been expressed (by planners) for more timely, frequent, spatially accurate, and geographically detailed data. On the other hand, further desires have been expressed (by planners) for reduced costs in acquiring (federal) Census products and services. Obviously, Statistics Canada could not possibly resolve one situation without negatively affecting the chances for resolving the other; particularly since attempts to provide more timely, frequent, spatially accurate, and geographically detailed data would, in all likelihood, only serve to increase collection and processing costs. As a result, some responsibility must be accepted by local governments to seek efforts to help themselves. The following recommendations subsequently attempt to reflect this consideration.

For the purpose of historical comparability, census users have expressed desires for continued maintenance of the Census in terms of present format, content, mediums and definitions, which undoubtedly limits further alterations and advances. Such historical comparability is absolutely essential for the observation of long-term trends and subsequent prognostic and diagnostic planning functions. The first recommendation forwarded to Statistics Canada is therefore as follows:

1. That the (federal) Census of Population and housing, where at all possible, be maintained in terms of definitions, content, mediums and formats so as not to jeopardize current levels of historical comparability.

Representatives for local governments with established information systems have expressed concerns over the lack of dissaggregate flexibility for Census data resulting from Census data release policies (which are tied to legislative confidentiality restrictions). Essentially, greater dissagregation is required in order to establish a higher level of flexibility where information services are integrated within a local government agency or network of local government agencies; particularly for the establishment of in-house geocoding/geoprocessing capabilities. As previously discussed in sub-section 4.1.5., federal legislative confidentiality restrictions require only that information not be released so as to identify an individual respondent or corporation. As a result, it may be that more stable and dissagregate data could be released than those currently provided via either the enumeration area or census tract programs. A second recommendation is therefore as follows:

> 2. That Statistics Canada examine the possibility of releasing "machine-readable" census data for smaller and more stable geographic units than currently exists, subject to legislative confidentiality restrictions.

If previously discussed assumptions hold true whereby an increasing number of municipal or regional agencies attempt to enjoin in a computer-assisted mode of operation by developing their own information system capabilities, the need and requirement for suitable classification and coding systems will increase -- particularly if data standardization is ever to advance. To further the standardization effort in this regard therefore, the following recommendation is offered:

3. That Statistics Canada -- in conjunction with current initiatives for land use classification and coding systems by Lands Directorate, Environment Canada -- seek to develop suitable classification and coding standards which incorporate Lands Directorate efforts with the Standard Industrial Classification System. Census data variables which reflect upon land use or activity as it applies to land areas (structural type, dwelling, industry, etc., as examples) should then subsequently be identified by resulting classification and coding criteria.

Over the years, Canada's smaller municipalities (less than 50,000 in population size) have received less consideration than more populated centres. At present, such municipalities are not included as part of the Census Tract program, nor have Area Master Files been established. As a result, special geographic requests are highly unreliable for such communities since Census geocoding can only be based upon the aggregation of enumeration areas or provincial census tracts rather than blockfaces. As previously discussed, however, enumeration areas are not always stable across census years, nor do they consistently distinguish built-up areas from non built-up areas. Most if not all Canadian municipalities in the 20,000 to 50,000 population size group have permanently employed planning staff who are therefore at a disadvantage where user flexibility for Census data by special districts is concerned. Subsequent recommendations in this regard are therefore as follows:

4. That Statistics Canada pursue efforts, including ways and means, to extend Area Master File geographic coverage for incorporated municipal areas less than 50,000 in population size. A logical starting point in this regard may be via PCMF coverage where block-face postal code delivery is available (as per sub-section 4.1.6.).
5. That further efforts be expended for the development and release of software capable of making amendments where boundary changes have occurred for geo-statistical reporting units.

Although far from conclusive, many desires have been expressed by local government planners for more timely, frequent and geographically detailed economic-related data. Literary sources, in turn, have emphasized that data of this nature are of utmost importance to local planning initiatives, particularly if planners are to acquire an understanding of the local economy and keep in step with development processes. Census data for labour force activity, income and employment, etc., are currently collected as a sample of the total population rather than full coverage, and can become rapidly outdated by or shortly after time of release. On this matter, the following recommendation is proposed:

> 6. That Statistics Canada continue to pursue research and development of (federal) administrative data via postal code conversion. The utility of such data, however, will depend upon its date of release meaning that a release date of beyond one year past the date of data capture would significantly reduce the value of such potential data products to serve the planning/monitoring function.

As a further point of consideration, there appears to be a substantial lack of census data manipulation software for regional/municipal planning agencies with access to computer-assisted resources. Furthermore, it appears as though many such agencies are currently required to "go it alone" as far as developing their own programs for address matching is concerned when establishing an information system from a collection of different files. In this regard, it may therefore be advantageous to the Census product if, as an additional service, suitable software packages could be provided to users desiring data products via user summary tape. It is therefore recommended:

7. That Statistics Canada, upon completion of the postal code/area master file linkage project, make provisions for release of not only the product in this regard, but also the conversion software for the purpose of providing a packaged address matching software program for municipalities/ regional authorities desiring to link census data to other data files. Furthermore, to aid those local authorities developing in-house capabilities, subsequent consideration should be given to the potential for release of additional Statistics Canada software relevant to statistical analysis, geocoding, geoprocessing, etc.

Even if all current data capture and release problems which exist for the many small communities and rural areas could be resolved, local government jurisdictions for such areas are least likely to have sufficient resources to effectively utilize resulting products and services. This is one area where a current dilemma, as it effects local governments, is most prevalent. At present, more emphasis is given, by Statistics Canada, to the provision of products and services focussed on the major urban centers (which receive the benefits from additional services not afforded to remaining areas). Aside from the distinctions for data capture and resulting dissemination flexibility, most significant in this regard are developments concerning the Census Metropolitan Atlas Series. For all intents and purposes, the Census Metropolitan Atlas Series currently represents the best available graphically and cartographically depicted "indicator" series across Canada, but is currently developed for the twelve largest metropolitan areas only. Where available, it appears to be highly regarded by local government planners for a number of reasons:

a) information, as opposed to raw data, are readily displayed in easier to comprehend graphic and cartographic format;
b) similar time and expense is saved by local governments in the attempt to provide anything similar; and

c) a broader, more regional representation of trends beyond that normally envisioned by many local governments can be brought to light than would normally be the situation.

The final recommendation to Statistics Canada is therefore as follows:

8. That the feasibility of extending the Census Metropolitan Atlas Series be studied to include other currently defined Census Metropolitan Areas not presently represented, plus currently defined Census Agglomerations. Further consideration could be extended to the development of similar geostatistical regions (socio-economically defined) for other remaining sub-provincial areas of the country for similar graphic and geocartographic representation.

5.3. PROSPECTIVE RECOMMENDATIONS TO LOCAL GOVERNMENTS

As shown by the discussions of the existing situation regarding data base development and application activities in local government, it is obvious that many aspects of the preferred situation (considerations and requirements) are beyond the reach of many local government agencies. There are, however, many deficiencies of the existing situation that are within reach, depending upon the management and planning direction that is pursued. The preferred situation could therefore serve as a standard against which data base development and application activities can be assessed and/or be pursued.

Discussion of the preferred situation (above) suggest that data base development activities should follow the lead initiated by the identification of intended applications; that is, an information system should be developed in relation to how, why and for what purpose it is going to be used. How, why and for what purpose an information system is going to be used in a local government setting should, therefore, reflect the corporate direction and specified courses of action intended for a particular agency.

If corporate direction and specified courses of action have not been clarified, then it is likely that an information system could be inapropriately developed or under-developed, and subsequently mis-used or under-used. On the other hand, where such needed corporate direction has been forthcoming, the potential of an information system (including potential contributions and influences to future policy directions) is greater. What is suggested, therefore, is the need for strategic planning in local government and all that it entails including the need to establish corporate direction via corporate planning procedures.

According to So (1984), the business strategic plan goes through a process that is partly similar and partly different to that for the traditional urban planning process. The differences, as emphasized, are such that strategic planning offers the more creative and potentially useful concepts for planning in the public domain. Essentially, the first step of strategic planning is to ask the question "How are we doing?"; a question which forces those involved to be honest, open and self-critical. The second step is to analyse the external factors -- political, social, economic and technological -- that affect the corporation (agency in question). The "environmental scan", as this process is sometimes called, includes those trends and factors over which there is little control. The third step is to examine critically the workings of the various elements (functions) of the corporation (agency). The fourth step is to analyze the implications of the first three.

The first four steps are frequently referred to as the situation analysis or the situation audit. They involve the identification of four areas -- in corporate argot, the "WOTS" of the situation -- weaknesses, opportunities, threats, and strengths.

The fifth step of strategic planning is to develop strategic objectives and sub-objectives, or as they are sometimes called, mission statements. These objectives seek to correct weaknesses, take advantage of opportunities, deal with threats, and build on strengths. To be strategic, objectives must therefore be few in number, and they must relate to the "bottom line" of any business (agency function). The situation analysis raises fundamental questions and issues and should therefore help lead to more realistic objectives.

The sixth strategic planning step involves implementation -- the preparation of plans, programs, budgets, etc. -- by dealing with the basic questions of why, what, when, who, and where, before moving into the final step of monitoring and feedback.[3]

Essentially, corporate strategic planning in local government can offer a new and relevant approach to arriving at policy decisions. It can also be appealing to those impatient with the long time it takes to prepare the studies that precede the traditional comprehensive plan since it is based upon the concept of an on-going continuous process rather than some future end-state. Furthermore, through strategic planning it is not always necessary to re-invent the analytical wheel, so to speak, but instead tends to exploit existing data and prior studies. A decision to improve information services and data bases is not in itself a strategic decision, however, but only one element in a process of activities.

Since the major contents of this study have been concerned primarily with data base development and application activities for local area analysis in urban and regional planning, following recommendations are confined to that

domain. Furthermore, the general intent of the recommendations is to identify areas where local governments can help themselves to resolve many of their current data deficiencies. Current practices regarding fragmentation and departmentalization of information services in local government inevitably result in higher costs associated with the inefficient duplication of effort and ineffective use of existing data sources. The recommendations are therefore intended as means by which local governments can reduce their long-term data and information costs while at the same time improving the opportunities for more effective data and information use. The recommendations are as follows:

1. That local governments make efforts to critically assess their current situation regarding information services and data base development activities and applications (as a situation audit/situation analysis), with a view towards determining (where appropriate, feasible, or desirable) which activities are currently deficient or problematical in relation to the institutional/agency function. Such an assessment should be concerned with the effective and efficient use of existing data sources (products and services both internally and externally derived) plus human and technical resource capabilities within and across various units, divisions, departments, etc., in the attempt to identify current strengths, weakness, opportunities and so on.

2. Where weaknesses exist and are subsequently identified either resulting from inefficient duplication of effort or ineffective and inefficient use of "existing" resources (data, financial, human, technical, etc.), the following points -- as potential strengths or opportunities -- should be examined as possible corrective actions:

   - the potential for integration of existing data sources and computer-assisted resources via the development or expansion of an intra-agency, centralized, multi-purpose and geographically based information system (where a centralized mainframe exists).
   - the potential for integration and sharing of existing data sources and computer-assisted resources via the initiation of an inter-agency, centralized, multi-purpose and geographically based information systems network; (via time-share arrangements through a private sector

service bureau, a cooperative-effort independent data bureau, or, in conjunction with an adjacent larger municipal or regional agency willing to share their currently underutilized resources, in order to provide assistance to those local government agencies without available in-house access to a centralized mainframe).

Intra-or inter-agency data sharing has the potential to significantly reduce individual development, maintenance/operation and future expansion costs, more so than if individual departments, or agencies for that matter, continually attempt to go it alone. Where shared service arrangements are contemplated, however, it is absolutely essential that time, consideration and deliberation be accorded to the specification of data elements, items, formats for the acquisition, storage/retrieval/manipulation, dissemination and application components in order to maximize satisfaction and potential benefits of all users.

3. In conjunction with the second recommendation, regional local government agencies should examine the extent to which they could provide assistance to their respective municipalities by assuming the leadership role for initiating computer-assisted data sharing arrangements.

4. As a further recommendation for those agencies more accustomed to a manual mode of operation seeking to or contemplating the development and initiation of computer-assisted information system capabilities, the following suggestions are offered:

   - start small, and base initiation upon the satisfaction of the most pressing and urgent needs;
   - take steps to ensure that what is developed can be expanded upon in the future;
   - make the best use of existing and available data sources (products and services), computer hardware and software most capable of satisfying or tailored to departmental or agency requirements, rather than attempting to "re-invent the wheel";
   - involve the staff that are going to operate it in any design and development procedures; and
   - be prepared to maintain the system on a continuous basis in order to ensure proper upkeep since interest and relevance soon dissipates for a data base which is outdated.

5. Regarding information system applications, where at all possible or feasible efforts should be made to establish projections of the major planning considerations. Such projections should preferably be based upon a small number of variables, and be concerned with natural demographic projections which further incorporate projections of the local economy. Essentially, more reliable forecasts require a good understanding of an area's development potential, attention to long-term trends and extrapolation for no further than half the time a trend is observed. Such forecasts should be used as a mechanism to assess alternative courses of action, in conjunction with specified strategic objectives or mission statements resulting from the situation audit/situation analysis.
6. Where projections have been established and corresponding plans, programs, budgets, etc., have been implemented, procedures for monitoring such activities should be initiated. Data for such monitoring activities may be largely operationally derived and may therefore be extracted from administrative data records such as land assesment, building permit records, official plan designations and zoning approvals, etc. Where such operationally derived data are to be employed to serve the monitoring function, it is imperative that they be integrated within the information system framework, suitably coded and relationally structured to ensure proper storage, retrieval and manipulation. Employed in this fashion, data of this nature may be used for the additional feature of establishing inter-censal estimates by extending natural demographic growth rates from the most recent census to the present, in conjunction with the number and type of newly constructed and occupied housing units (minus demolitions).

It must be recognized that all of the immediately preceding recommendations may be largely out of reach for municipalities less than, say, 50,000 in population. Their situation is considerably more confined and less flexible in terms of resolving many of their needs via self-help initiatives. The situation for small communities across Canada has, however, recently been well researched and documented by the Federation of Canadian Municipalities study (Wellar et al, 1982). The publication presents a number of well-founded recommendations for consideration by officials in small communities. As

emphasized, the "recommendations are pragmatic, action-oriented, and directly applicable to the resolution of major problems affecting management and community planning functions of small municipalities."[4] A final recommendation to local governments is therefore as follows:

> 7. That serious efforts be taken to institute or implement the recommendations presented in the Federation of Canadian Municipalities report. Specifically, with regard to the community (local) planning function, one recommendation in particular has direct applicability to this study and provides for comparability between that study and this one. Since the recommendation is also appropriate to many other large (local) planning agencies it is hereby re-stated:
>
> "There is a lack of specific development objectives and measurable targets in a number of important areas in small community development (e.g. employment, population, "Main Street" development). There is a similar lack of studies or investigations supporting most small municipalities "Official Plans". It is therefore recommended that Official Plan preparation activities include analysis directed towards the formulation of appropriate longer term development targets for the municipality or a joint planning area, which could be incorporated into the Plan. At a minimum, these studies should include:
>
> a) an economic base and development study;
> b) an analysis of the social attitudes towards community growth, development and participation;
> c) an analysis of the financial implications of the plan and implementation program for the municipality; and
> d) an inventory and analysis of the key agencies, funds, policies, facilities and other resources required to implement the plan over time."[5]

Essentially, if public agencies do not attempt to review, assess and evaluate their current activities (preferably on a regular basis), it is likely that little knowledge, understanding or appreciation of their current situations will be realized. Without this realization, agencies can become inward-looking to the point where they may not be providing products/services to their users/constituents as effectively or efficiently as they could be. This situation applies to both Statistics Canada (regarding Census of Population and Housing products and services) and local government agencies (regarding policies, programs, and projects, including data base development and application activities).

5.4. NOTES/REFERENCES

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3 So, Frank, S. (1984). "Strategic Planning: Reinventing The Wheel?", Planning, American Planning Association, Feb., 1984, 16-21.

4 Wellar, Barry S., G. Brinkman and Woods, Gordon Ltd. (1982). "Management And Planning Capabilities In Small Communities", Federation of Canadian Municipalities, Ottawa, Ontario, Page 4.

5 Ibid, Page 13.

6.0. CONCLUSIONS

Examination of the preferred situation for data base development and application activities in relation to the existing situations revealed many gaps/differences. The nature of the gaps/differences between products and services of the (federal) Census of Population and Housing that are provided, data needs identified for urban and regional planning at the local government level, and the operations/practices of local government agencies, primarily involves six main domains:

1. Temporal - in terms of length of time between Census takings, and length of time between the taking of the Census and release of Census products;

2. Spatial - in terms of detailed delineation, data collection and subsequent dissemination of Census Products and Services outside of Area Master File delineated areas, and in terms of dissemination policies for dissaggregate Census data release in general;

3. Financial - in terms of the costs for acquiring products and services of the Census of Population and Housing, and the limited resources of many local government agencies;

4. Technical - in terms of desires by Planners for scaled-down software capabilities in compliance with smaller operational needs, and the limited use of information technology to support the local planning function;

5. Subject Matter - in terms of comparability of products and definitions of the Census over time, with other data sources, and for comparable land statistics data in urban areas; and

6. Philosophical - in terms of the attitudes and perceptions by many Planners towards the use of computers, the use of analytical methods and techniques, and the practice of corporate/strategic planning in local government.

Census data are routinely acquired by most local planning acencies. Since the (federal) Census of Population and Housing has not traditionally or intentionally been designed to serve local planning needs, however, it therefore tends to serve local government planners as an external and subordinate source of available data.

The overall severity of gaps (between the data needs of local government planners and the products and services of the federal Census of Population and Housing) should they continue, are difficult to fully assess due to the existence of other gaps resulting from the different needs, concerns, and research capabilities across planning agencies at the local government level. As suggested, many of the gaps can be overcome through corporate/strategic planning initiatives, the development or expansion of computer-assisted information system capabilities, and integration of information services previously identified as prospective recommendations to local governments. Many other gaps could potentially be bridged via research and developmental efforts at Statistics Canada, as suggested in the discussion of the agency's prospective contributing role.

Since many of the identified data needs could be traced to disparities and obvious differences between the preferred situation for data base development activities and the existing situation regarding the (federal) Census of Population and Housing, recommendations theoretically could have called for considerably more effort and demands upon Statistics Canada. For example, requests could have been made to Statistics Canada to assume the role of national data clearinghouse directly in proportion to that previously discussed in sub-section 3.5., and subsequently seek to resolve all data needs according to identified considerations for the preferred situation.

The findings from the survey of local planners were not consistent enough, extensive enough or conclusive enough, however, to warrent the suggestion of immediate action by Statistics Canada in this regard. The costs associated with the establishment of such an institutional arrangement (complete with the collection and dissemination of annual data at the property parcel level, for all areas of the country) would, unquestionably, run very

high. Furthermore, the technical complexity associated with a project of this nature might only serve to reduce confidence (of Statistics Canada products and services) to less than currently exists. The findings from this study of preferred and existing situations could serve, however, as a suitable pilot study for further investigative research in this area. Due to complications encountered during the survey it now appears clear, for example, that a more thorough investigation might be more appropriately organized through a more influential organization, preferably an organization which is regarded highly enough to establish a more consistent overall response and therefore assess the nation-wide significance of the research findings.

The initiation and implementation of nation-wide data collection procedures at the property parcel level and on an annual basis would unquestionably advance data standardization across Canada. A project of this nature and magnitude, however, would require a massive undertaking well beyond the capacity of existing resources, opportunities, and capabilities at the federal level. Before such a large endeavor should ever be attempted, therefore, a definite need and support must first of all be very clearly identified.

What is suggested then, in conclusion, is a final recommendation that was not anticipated at the outset of the study:

> That the Canadian Institute of Planners, as the national organization of urban and regional planning practicioners, initiate efforts to identify data needs and attitudes of planners at the local level with a view towards establishing where current standardization efforts could be improved in general, and where local needs could best be resolved at the federal level in particular. Such an effort should not be confined to planners employed by local government agencies, but should include academic researchers and planners employed with private consulting firms, particularly since they are less capable of satisfying their needs through locally generated operational (administrative) data.

7.0. BIBLIOGRAPHY

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APPENDIX

THE USE/UTILITY OF FEDERAL CENSUS PRODUCTS AND SERVICES AND APPLICATION TO ANALYTICAL METHODS AND TECHNIQUES BY LOCAL GOVERNMENT PLANNERS IN THE OTTAWA-HULL AREA

AN EMPIRICAL INQUIRY

The appendix reports on findings from an empirical study on the use/utility of (federal) Census products and services (Census of Population and Housing) and applications of analytical methods and techniques by local government planners in the Ottawa-Hull area. The contents are based upon direct observations from a combined survey-questionnaire/standardized interview. This appendix serves as an in-depth supplement to the text of the thesis.

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LIST OF ILLUSTRATIONS

1.0. INTRODUCTION

This section reports on findings from administering a questionnaire and conducting interviews with planners employed by local government planning agencies (regional, urban, suburban-rural) in the Ottawa-Hull area.* The purpose of the questionnaire-interviews was to obtain "first-hand" observations, that is, primary data on the use/utility of federal Census products and services (Census of Population and Housing) and specific statistical and planning-related analytical methods and techniques of relevance to local area analysis . The origin or basis for the inquiry was to confirm or refute whether a statement of problem exists between available (federal) Census products and services and the current and impending data and research instruments needed to conduct local area analysis in local government planning.

Specific objectives established for the inquiry were as follows:

1. To determine which federal Census products and services (Census of Population and Housing) are acquired, used, and the general purpose and frequency of their use by local government planning agencies;
2. To determine data elements/items perceived to be of greater (or greatest) relevance to planning (census and/or non-census derived);

* The Ottawa-Hull area is herein defined as it applies to local government jurisdictions (Regional Municipality, City, Township, Communauté Régionale, Cité, etc.) with formal, recognized planning agencies inside of and including the administrative boundaries for the Regional Municipality of Ottawa-Carleton (RMOC) in Ontario, and the Communauté Régionale de l'Outaouais (CRO) in Quebec.

3. To elicit and document comments and perceptions on the major attributes and/or shortcomings, in a local planning context, of federal census products and services;
4. To elecit and document comments and perceptions on required improvements/changes to federal census products and services for use in local planning;
5. To elicit and document comments and perceptions on the potential of administrative records as a supplement to the census -- in terms of the potential relevance to planning -- including the perceived potential use/utility of the postal code as a geographic locator for small area statistics derived from administrative data records; and
6. To elicit and document comments and perceptions of probable or impending changes to local planning research and analysis activities. That is, comments and perceptions in terms of perceived increases in computerization or functional revision of analytical activities via strategic/corporate re-direction (to identify areas for analysis, monitoring, and assessment of policies, plans, and programs on the basis of predetermined aspirations and objectives).

Following sections document the methodological procedures for designing and conducting the research effort, present and discuss the research findings, and summarize the overall contents of the inquiry.

2.0. METHODOLOGY

To pursue the research objectives, procedures were developed to methodologically design and conduct the research inquiry and provide a means to assess the survey findings.

2.1. Research Design

The first step involved considerations related to survey requirements, limitations, and preferred procedures.

Essentially, survey requirements involved specifying and following a methodologically-based approach capable to satisfying the research objectives. The prime requisite was to elicit direct observations on the subject matter from local government planners. It was therefore decided to conduct a survey according to the three research design evaluation tools -- pilot study, pretest and trial run.

There were factors to be considered which placed limitations on the overall research design:

a) Resources were limited (financial, temporal) which forced dependence upon a small sample of respondents:
b) Response would have to be completely voluntary; and
c) Because of the detailed nature and qualitative orientation of the objectives, procedures had to be built-in to avoid mis-representation, ensure proper consideration of content, avoid bias, and maintain individual control over the research exercise.

To determine alternative and preferred operational procedures, a literature search was conducted to establish the most appropriate type of survey to achieve the stated objectives. Literature sources having the largest influence on the survey design were as follows:

i) Ackoff, R.L. (1953). "The Design of Social Research", University of Chicago Press, Chicago.

ii) Backstrom, C.H. and Hursh-Cesar, G. (1981). "Survey Research", John Wiley & Sons, Toronto.

iii) Bracken, Ian (1981). "Urban Planning Methods: Research and Policy Analysis", Methuen & Co. Ltd., London.

iv) Hyman, H.H. (1975). "Interviewing in Social Research", University of Chicago Press, Chicago.

v) Watson, G. and McGraw, D. (1980). "Statistical Inquiry: Elementary Statistics for the Political, Social and Policy Sciences", John Wiley & Sons, Toronto.

Prior research findings (Jackson and Wanio, 1979) outlined a number of criteria as determinants for the more extensive and sophisticated use of statistics by Canadian local governments in general, which, at the same time, were more demanding of the full range of census variables. Several of the criteria that determines heavier census use in local government are as follows:

i) areas administered by a two-tier (municipal and regional) local government structure;

ii) local governments administering areas with large and growing populations; a-d

iii) local governments in close proximity to the data services of Statistics Canada.[1]

[1] Jackson, G. and Wanio, T. (1979). "Statistical Information: Its Use By Local Governments In Canada", M.P1. (R.P.) Research Project, Queen's University, Kingston.

Based on these findings, and since the local (Ottawa-Hull) situation satisfied the criteria noted above, it was assumed at the outset that local government planning agencies in the Ottawa-Hull area (as defined in the introduction) could serve as a suitable sample. Upon pretesting the questionnaire (Section 2.2. below), it was confirmed, however, that planning research (including Census data acquisition and application), was often a specialized function within planning departments. The sample was limited in application, therefore, to local government planners in the Ottawa-Hull area with specific functions pertaining, in whole or in part, to the acquisition, storage, maintenance, retrieval and/or application of federal Census products and services.

In order to further comply with the research limitations of b) and c) above, it was decided to proceed with a combined questionnaire/standardized interview approach.

2.2. Survey Formulation and Development

The second step involved formulation, development and revision of the questionnaire.

To pursue the first four research objectives above (sub-section 1.0), it was felt that check lists of (federal) Census products and services and statistical and planning-related methods and techniques would be an appropriate means of identifying where such use exists. In order to develop the check lists in this regard, knowledge of existing Census products and services, and knowledge of statistical and planning-related methods and techniques were required.

Further exploratory studies were therefore conducted for the purpose of determining:

a) federal Census of Population and Housing products and services available from Statistics Canada; and
b) statistical and planning-related methods and techniques which "might" be employed in local government planning operations.

The following documentation was consulted for a) above, regarding census products and services:

i) Boivenue, A. and Parenteau, R. (1982). "The Geocoding System in Canada and Its Area Master File", URISA, 226-232.

ii) Bright, D. and Pryor, E. (1982). "The 1981 Census of Canada: Census Products and Services, Supplier Views on Content and Output", URISA 43-56.

iii) Hirsch, C. (1975). "1971 Census of Population and Housing: A Marketing Analysis", Long Range Planning Group, Statistics Canada, Ottawa.

iv) Radley, L. and Kopustas, N. (1981). "Postal Geocoding Systems and Small Areas: Administrative Data. Applications (unpublished)", Administrative Data Development Staff, Statistics Canada, Ottawa.

v) Statistics Canada (1982). "1981 Census Dictionary", Ottawa.

vi) Statistics Canada (1982). "Geography And The 1981 Census of Canada", Working Paper (Geography Series) No. 2-GEO 82.

vii) Statistics Canada (1972). "GRDSR: Facts By Small Areas", Ottawa.

viii) Statistics Canada (1982). "Products And Services Of The 1981 Census of Canada", Ottawa.

The Hirsch (1975) marketing report was found to be particularly helpful for identifying prior comments and complaints of census shortcomings/ deficiencies, as identified by other federal agency and provincial users.

The following literature was consulted for b) above, regarding statistical and planning-related methods and techniques.

i) Barras, R. and Broadbent, T.A. (1982). "A Review of Operational Methods in Structural Planning", Progress in Planning, Vol. 17, 53-268.

ii) Batey, P.W. J. and Breheny, M. J. (1978) "Methods In Strategic Planning", Town Planning Review, Vol. 49 No. 3, 259-273.

iii) Bracken, I. (1981). "Urban Planning Methods: Research and Policy Analysis", Methuen, London.

iv) Catanese, A.J. (1972). "Scientific Methods of Urban Analysis", University of Illinois Pres, Chicago.

v) Chapin, F.S. and Kaiser, E.J. (1979). "Urban Land Use Planning", University of Illinois Press.

vi) Johnson, R.R. (1976). "Elementary Statistics", Wadsworth Publishing, Belmont.

vii) McLaughlin, J.B. (1969). "Urban And Regional Planning: A Systems Approach", Faber & Faber, London.

viii) Roberts, M. (1974). "An Introduction To Town Planning Techniques", Hutchinson, London.

ix) Steiss, A.W. (1974). "Models For The Analysis And Planning Of Urban Systems", D.C. Heath, Lexington.

x) Watson, G. and McGraw, D. (1980). "Statistical Inquiry: Elementary Statistics For The Political, Social And Policy Sciences", John Wiley & Sons, Toronto.

Due to the abundance and variety of different methods and techniques for statistical and planning-related analysis referenced in the literature, methods and techniques were listed from each source and compared and tabulated across sources in terms of frequency. Those methods and techniques referenced and documented by more than one source were to be incorporated into the survey-questionnaire in checklist format.

The first draft of the survey-questionnaire was designed: a) for structure and format, based on the above references (from sub-sections 2.1. and 2.2.); and b) for content, based on the established objectives. Due to the nature of the detailed objectives, questions were designed to ensure qualitative as well as quantitative assessment. Within the questionnaire, attempts were made to build in checks against initial responses. General questions pertaining to use of census products and services were followed by similar questions of more detailed and specific content. Respondents would be requested to: 1) list data products most relevant to planning in rank-order format; 2) comment on major deficiencies of products and services (where changes could be made to accommodate planning needs); and, 3) to rate the severity of census shortcomings cited from prior census years. Respondents would further be requested to: 4) identify general purpose of use for census products (for descriptive, analysis and/or projection purposes); 5) identify the use (and frequency of use) versus non-use (and reasons for non-use) of specific statistical and planning-related methods and techniques; and, 6) have such methods and techniques identified to corresponding data items. Evaluative methods and techniques were included to determine whether or not agencies had established formalized frameworks whereby research and analysis was conducted on the basis of established corporate goals and objectives.

Following initial survey-questionnaire formulation, a series of procedures were pursued to further develop and revise the content and format. The first draft was examined and revised based on comments and direction from the research supervisor. The second draft was then pretested for evaluative purposes with representatives from the following agencies:

a) Statistics Canada --- Geography and Demography Divisions; and

b) Regional Municipality of Ottawa-Carleton -- Policy and Program Division.

Comments, criticisms, and recommendations (in terms of content, format and consistency) were received, assessed, and incorporated, when appropriate, into a subsequent revision.

The questionnaire (3rd draft) was then subjected to a trial run for final evaluative purposes with a representative from the City of Ottawa Planning Department, Urban Policy and Research Division. Further comments, criticisms, and suggestions were again received and, following final consultation with the research supervisor, were incorporated where relevant into the finalized draft of the questionnaire (attached with forwarding note as Appendix A.1.).

2.3. Survey Execution

The final step involved administering the questionnaire and conducting interviews.

Planning agencies in the Ottawa-Hull area were determined from the Government Services section of the Ottawa-Hull area telephone directory. Contacts were made by telephone informing potential respondents of the purpose and subject matter of the survey, with requests for agreed participation. Copies of the questionnaire were delivered by hand to contacts within each planning agency for distribution to willing participants, and left with them for a period of one to two weeks to be completed.

Further contact was made to arrange for interviews with respondents. In a few situations, only one contact was available per agency. In other situations, more than one contact was available and interviews had to be conducted as a "round table" but "controlled" discussion. That is, interviews were structured on the basis of the questionnaire to ensure that each question was thoroughly understood, and were used to elicit further comments on perceived or impending changes to research and analysis practices.

Representatives for all local government planning departments contacted agreed initially to participate in the survey. Not all local government jurisdictions in the Ottawa-Hull area, however, had formalized planning departments, particularly the distant and more rural townships. The City of Hull indicated that it was without a formalized planning department, and that administrative duties were handled through a technical services department; any planning or research work that was required was generally contracted out through private consulting firms.

Representatives from two separate planning agencies which had initially agreed over the telephone to participate in the survey, subsequently declined following receipt of the questionnaire (without attempting to complete it). They further declined to participate in any interviews. Representatives from two other agencies participated in the questionnaire component, but then declined to participate in the interviews. Reasons cited for refusing to respond to the questionnaire and/or participate in the interviews were as follows:

i) Language problems were cited whereby the questionnaire was written in English whereas staff were conversant in French;

ii) Staff were too busy to participate; or

iii) Having "attempted" the questionnaire, the interviews were considered to be repetitious and therefore unnecessary.

FIGURE 1 identifies the planning agencies contacted, and indicates the agencies where questionnaires were completed and interviews conducted.

3.0. OBSERVATIONS - QUESTIONNAIRE ADMINISTRATION

The purpose of this section is to report upon the findings from responses to the questionnaire. Throughout various parts of this section, individual comments received have been identified. Where identified, such comments are linked to a general non-identifiable source (for confidentiality reasons), that is, Regional, Urban, or Suburban - Rural.

3.1. Findings from sub-section 1.0. (1.1. to 1.4.) of the questionnaire

Section 1.1. of the questionnaire was designed to gather and identify the names of the local planning agencies (regional, urban, or suburban-rural) and the corresponding departmental division (where applicable). Participating agencies and corresponding departments/divisions, as previously identified, are recorded in FIGURE 1. Each agency is further identified in Figure 1 in terms of the nature and extent of the areas to which they are responsible for,

FIGURE 1: PARTICIPATING AGENCIES

Local Government Planning Agencies In The Ottawa-Hull Area	Nature Or Extent Of Planning Jurisdiction	Questionnaire	Interview
Regional Municipality of Ottawa-Carleton: Policy Program Division	Regional	*	*
Regional Municipality of Ottawa-Carleton: Transportation Planning Division	Regional	X	X
Ottawa-Carleton Social Planning Council	Regional	*	*
City of Ottawa: Planning Department, Urban Policy and Research Division	Urban	*	X
City of Vanier: Department of Planning and Development	Urban	*	*
City of Nepean: Planning Department	Suburban-Rural	*	*
City of Gloucester: Planning Department	Suburban-Rural	*	*
City of Kanata: Planning Department	Suburban-Rural	*	*
Township of Cumberland: Planning Department	Suburban-Rural	*	X
Communauté Régionale de l'Outaouais: Planning/ Technical Services	Regional	*	*
Ville de Hull: Technical Services	Urban	X	X
Ville de Gatineau: Urbanisme	Suburban-Rural	X	X
Ville d'Aylmer: Planning Department	Suburban-Rural	*	*

* Indicates participation (questionnaires were completed or interviews held).
X Indicates non-participation (either questionnaire not completed or interview not held).

that is, regional, urban, or suburban-rural. Although Aylmer and Gatineau both contain older, more established urban land areas, they were identified as Suburban-Rural due to the existence of significant suburban and rural land areas.

Section 1.1.1. sought to identify those planning jurisdictions with direct access to and use of in-house or service bureau computing facilities. Only two -- the City of Ottawa Planning Department, Urban Policy and Research Division, and the Planning Department for the Regional Municipality of Ottawa-Carleton, Policy Program Division -- indicated possession and use of such facilities. Of the respondents from the two agencies with direct access to computer facilities, 86% indicated personal use during regular work activities. Of the remaining participants who responded as users of computing facilities, 33% indicated the nature of use involved data storage, processing and updating only, whereas the remaining 67% indicated the nature of use as data storage, processing, updating and "analysis".

Section 1.1.2 attempted to establish, for all agencies, the primary means, dependency and preference for federal Census data acquisition. Respondents for three out of ten agencies indicated pre-packaged (off-the-shelf) data sources by standard census geographic areas as their primary means of data acquisition; respondents for one agency indicated special (custom) requests; and, respondents for the six remaining agencies indicated both. Of those six agencies indicating both (pre-packaged and custom servicing of data) as their primary means of data acquisition, five indicated a greater

dependence upon pre-packaged data sources by standard geographic areas. Respondents for three agencies indicated a general preference for tabular data by single variables. Respondents for one agency indicated a general preference for data which had been cross-classified. And, respondents for the six remaining agencies indicated equal preference for either data source.

Sections 1.2.0 to 1.4.0 attempted to establish the use and frequency of use for overall (federal) census products and services, that is, data products (ink-print publications), analytical and reference products, non-print products, geographic areas of request, and custom tabulations. FIGURE 2 illustrates the use versus non-use as a percent of total respondents, plus frequency of use expressed as a percentage of those respondents who use them.

As evident from FIGURE 2, the profile series for specific geographic areas is by far the most popular with local planners: 100% as opposed to 47% each for use of the national or provincial series. Sixty percent of all respondents further indicated use of the profile series on a frequent basis (daily/weekly/monthly). Sixty-seven percent of all respondents indicated use of general reference and geographic reference products with majority of use on an occasional (semi-annual/annual) basis. Forty-seven percent and 33% of all respondents, respectively, indicated use of the content and metropolitan atlas (descriptive) series, again with occasional use representing the majority in terms of frequency. Only 20% of all respondents indicated use for all non-print products (for example, products on microfiche, summary tape or through CANSIM). For those respondents where use was indicated, 67% indicated occasional use of products on microfiche, 67% indicated frequent use of products by use of summary tape, and 67% indicated infrequent use (2 to 5 years or more) for CANSIM.

FIGURE 2:

	% of all respondents		% of those respondents who use them		
			Frequency of use		
1.2.0 For the following general categories Statistics Canada products and services, check (✓) whether or not your agency uses them and if so the frequency of use	Not used	Used	Frequently (daily/ weekly/ monthly)	Occasionally (semi-annual/ annual	Infrequently (2 to 5 years or more)
1.2.1 Data Products: (ink-print publications)					
a) National Series (data for Canada and the Provinces)	53	47	-	71	29
b) Provincial Series (separate bulletin for each Prov.)	53	47	-	86	14
c) Profile Series (for specific geographic areas)	-	100	60	33	7
1.2.2 Analytical and Reference Products					
a) General Reference Products (i.e. Census Dictionary, Summary Guides, Data Quality Publications, Census Tabulation Guide, etc.)	33	67	20	60	20
b) Geographic Reference Products (E.A. maps, Street Index, etc.)	33	67	30	60	10
c) Descriptive Series					
c-1. Content Series (topical socio-economic trends)	53	47	29	71	-
c-2. Metropolitan Atlas Series (thematic maps for census metropolitan areas)	67	33	-	100	-
1.2.3 Non-print Products					
a) Products (tables) on microfiche	80	20	-	67	33
b) Products by user summary tape	80	20	67	33	-
c) CANSIM	80	20	33	-	67
1.3.0 Geographic Framework (data products by geographic area)					
1.3.1 Administrative					
a) Provinces and Territories	67	33	20	40	40
b) Federal Electoral Districts	80	20	-	67	33
c) Census Divisions	40	60	33	67	-
d) Census Consolidated Subdivisions	80	20	33	67	-
e) Census Subdivisions	33	67	40	40	20
1.3.2 Statistical					
a) Census Metropolitan Areas/Census Agglomerations	13	87	46	54	-
b) CMA/CA Parts	40	60	33	67	-
c) Census Tracts	7	93	50	50	-
d) Provincial Census Tracts	80	20	-	67	33
e) Urban Areas	33	67	30	50	20
f) Enumeration Areas	20	80	50	33	17
1.4.0 Custom Tabulations (User Request Tables)					
a) by Standard Geographical Areas	53	47	43	29	28
b) by non-standard geographical (special request) areas	60	40	33	33	33

With respect to geographic framework, census divisions, census subdivisions, CMA's/CA's, CMA/CA parts, census tracts, urban areas and enumeration areas were all indicated as used by a majority of respondents. In terms of frequency of use, that of census tracts and enumeration areas was high, whereas all other geographic areas were used only occasionally. Custom tabulations for standard and non-standard geographical areas were both cited for use by less than 50% of all respondents (43% and 33% respectively) with frequency of use being equally distributed.

Spaces were provided for additional comments pertaining to all of section 1.0. of the questionnaire. Comments received are briefly outlined as follows:

i) one of the smaller municipalities indicated acquisition of Census products through the Regional Municipality of Ottawa-Carleton, rather than directly from Statistics Canada (suburban/rural);

ii) respondents for one of the regional agencies which had indicated use of custom tabulations for non-standard areas identified a number of prior problems acquiring such products and services (high costs, inaccurate map scales, resulting low estimate with respect to time for receiving product, and, boundary problems associated with the use of centroids) (regional);

iii) one of the smaller municipalities indicated its situation as being plagued by an insufficient number of staff to make proper use of census data (suburban-rural); and

iv) another municipality indicated a preference for annual assessment data and noted that Census information was generally out of date before it was received (suburban-rural).

3.2. Findings from section 2.0. (2.1.0. to 2.3.0) of the questionnaire

Section 2.0 of the questionnaire was designed for the following purposes: 1) to tabulate in detail data products (data elements or variables) from the federal Census of Population and Housing which were acquired by local planning agencies for dissemination to the general public; 2) to indicate those data products used versus not used; and, 3) where used, to establish the general purpose and frequency of use based on those categories provided. FIGURE 3 illustrates the results of section 2.0.

It is noteworthy that all specific data products were each indicated to be used by greater than 30% of all respondents (Column 3, FIGURE 3). There were variations, however, across groups and within groups of data element names (where data element names refer to the various sub-groups for demographic data variables -- social cultural, labour characteristics, etc.). Data element names indicated as used by the greater number of respondents are listed in FIGURE 4 as mean values, in conjunction with corresponding standard deviation scores (to indicate degree of variation within groups of data element names) from highest to lowest used.

FIGURE 3:

2.0 For the following Statistics Canada census data products (variables by sub-groups). Check ( ) the appropriate columns i.e. the first column if variables are acquired for public access; not used or used; the general purpose of use; the frequency of use, etc. Ignore the final column on methods and techniques for now; complete after section 8.0.

	% of all respondents			% of those respondents who use them					
				General purpose of use			Frequency of use		
	Acquired (for dissemination to public).	Not used	Used	Description (of current situation)	Analysis (of relationships)	Projection (of trends i.e. forecast)	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annual)	Infrequently (2 to 5 years or more)
2.1.0 Population Variables (mean = 87% used)									
a) population counts (in general)	53	13	87	100	85	92	69	31	-
2.1.1 Demographic (mean = 75.1 % used)									
a) age	53	7	93	93	93	93	50	50	-
b) sex	53	7	93	93	86	79	50	50	-
c) marital status	47	13	87	92	69	46	39	54	7
d) first marriage: age/date	13	67	33	100	60	40	-	80	20
e) fertility	27	47	53	88	75	75	38	37	25
f) mobility status	53	13	87	77	77	54	15	62	23
g) family status	40	20	80	83	92	75	42	58	-
2.1.2 Social/Cultural (mean = 49.4 % used)									
a) place of birth	20	60	40	100	50	33	-	100	-
b) immigration: age/date	27	67	33	100	20	20	-	80	20
c) citizenship	20	73	27	100	25	25	-	75	25
d) ethnicity	40	13	87	92	46	23	15	62	23
e) religion	27	40	60	89	56	22	-	78	22
2.1.3 Language (mean = 62 % used)									
a) mother tongue	60	20	80	93	33	17	25	75	-
b) home language	60	47	53	100	25	25	37	50	13
c) official language	60	47	53	100	25	25	25	62	13

FIGURE 3: - Continued

	% of all respondents			% of those respondents who use them					
				General purpose of use			Frequency of use		
	Acquired (for dissemination to public).	Not used	Used	Description (of current situation)	Analysis (of relationships)	Projection (of trends i.e. forecast)	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annual)	Infrequently (2 to 5 years or more)
2.1.4 Education (mean = 58.5 % used)									
a) school attendance	53	40	60	89	22	33	22	67	11
b) highest grade	53	53	47	86	14	29	29	57	14
c) number of years	53	40	60	89	33	22	22	67	11
d) highest degree	53	33	67	90	30	20	10	60	30
2.1.5 Economic Activity (mean = 48.7 % used)									
a) labour force activity	60	20	80	92	75	50	50	33	17
b) weeks worked	47	67	33	100	40	40	20	60	20
c) hours worked	47	67	33	100	40	40	20	60	20
2.1.6 Labour Characteristics (mean = 66.9 % used)									
a) place of work	60	27	73	100	64	36	36	55	9
b) industry	60	20	80	100	75	33	25	58	17
c) occupation	60	40	60	100	75	22	11	67	22
d) class of worker	53	47	53	88	50	25	13	62	25
2.1.7 Income (mean = 56.25 % used)									
a) total income	60	15	85	85	77	23	31	46	23
b) wages and salaries	53	33	67	90	60	30	40	30	30
c) self employment	53	60	40	100	50	50	50	33	17
d) transfer payments	47	67	33	80	40	40	60	-	40

FIGURE 3: - Continued

	% of all respondents			% of those respondents who use them					
				General purpose of use			Frequency of use		
	Acquired (for dissemination to public).	Not used	Used	Description (of current situation)	Analysis (of relationships)	Projection (of trends i.e. forecast)	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annual)	Infrequently (2 to 5 years or more)
2.2.0 Housing Variables (mean = 93 % used)									
a) general housing count	60	7	93	86	71	50	43	57	-
2.2.1 Private Occupied Dwelling Variables (mean = 54.3 % used)									
a) structural type	60	20	80	92	67	33	42	58	-
b) period of construction	60	27	73	91	82	36	36	55	9
c) number of rooms/bathrooms	53	53	47	100	43	29	29	57	14
d) heating equipment	53	53	47	100	14	14	29	29	42
e) need of repairs	53	67	33	100	33	17	33	50	17
f) value	53	47	53	88	50	25	25	50	25
g) fuel used	53	53	47	100	43	14	29	29	42
2.2.2 Private Household Variables (mean = 57 % used)									
a) tenure: owned/rented	60	20	80	83	92	50	33	67	-
b) length of occupancy	53	60	40	100	67	33	33	33	33
c) type of household: i.e. family/ non-family	60	27	73	91	73	45	27	73	-
d) rent: cash/gross	53	47	53	100	37	25	13	74	13
e) rent to income ratio	53	40	60	100	50	25	22	67	11
f) owner's expenditures	53	60	40	100	50	33	50	17	33
g) owner's expenditures to income ratio	53	53	47	100	43	29	43	43	14
h) crowding index	53	60	40	100	50	33	33	33	33
i) household income	53	20	80	92	42	17	17	67	17

FIGURE 3: - Concluded

	% of all respondents			% of those respondents who use them					
				General purpose of use			Frequency of use		
	Acquired (for dissemination to public).	Not used	Used	Description (of current situation)	Analysis (of relationships)	Projection (of trends i.e. forecast)	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annual)	Infrequently (2 to 5 years or more)
2.3.0 Census Family Variable (mean = 80 % used)									
a) type of family: husband-wife/ lone parent	60	20	80	92	50	33	33	50	17
b) number of children	53	20	80	92	50	42	33	50	17
c) family income	53	20	80	92	50	42	25	50	25
d) characteristics of family members	53	20	80	92	50	33	25	50	25

FIGURE 4: DATA ELEMENT NAMES - USE, VARIATION

Data Element Name	Mean Use (expressed as a % for all respondents)	Standard Deviation
Housing Variables	93.00	0.00
Population Variables	87.00	0.00
Census Family Variables	80.00	0.00
Demographic	75.10	21.40
Labour Characteristics	66.50	10.60
Language	62.00	12.73
Education	58.50	7.23
Private Household Variables	57.00	16.00
Income	56.25	20.90
Private Occupied Dwelling Variables	54.30	15.24
Social/Cultural	49.40	21.84
Economic Activity	48.70	22.16

A higher standard deviation score indicates a greater range of variation for use of individual data products within groups of data element names, which means that some data products within a data element name are used by a greater or lesser number of respondents than others. In other words, one data product within a grouped data element name may be of particular importance to local planning research, but the remaining data products are not. The best example in this regard would be that for Economic Activity which has a standard deviation of 22.16.

Within groups of data element names, mean scores for use of specific data products are also shown in FIGURE 3. Those specific data products indicated as used by a greater number of respondents (used by 60% or greater), regardless of grouping within data element names, are listed (from highest to lowest use) in FIGURE 5.

FIGURE 5: GREATEST USE OF SPECIFIC DATA PRODUCTS

Data Product	Mean Use (expressed as a % for all respondents)
General Housing Counts	93.0
Age	93.0
Sex	93.0
General Population Counts	87.0
Marital Status	87.0
Ethnicity	87.0
Total Income	85.0
Type of Family: husband-wife/lone parent	80.0
Number of Children	80.0
Family Income	80.0
Characteristics of Family Members	80.0
Family Status	80.0
Industry	80.0
Mother Tongue	80.0
Tenure: owned/rented	80.0
Household Income	80.0
Structural Type	80.0
Labour Force Activity	80.0
Place of Work	73.0
Type of Household: family/non-family	73.0
Period of Construction	73.0
Highest Degree	67.0
Wages and Salaries	67.0
Occupation	60.0
School Attendance	60.0
Number of Years (education)	60.0
Rent to Income Ratio	60.0
Religion	60.0

All other data products were indicated as used by less than 60% of all respondents (FIGURE 3).

In terms of general purpose of use, all data products were used for descriptive purposes by an overall average of greater than 90% of all respondents. The overall average response rate for analysis purposes was greater than 50%, whereas the overall average for use for projection purposes exceeded 35%. The findings suggest extensive use of federal Census data across local planning agencies for descriptive purposes, plus a significantly broad range of use for analysis of relationships between data items. The lower overall response rate for use of ensus data for projection (forecasting) purposes suggests a limited dependency on Census data for such purposes.

In agencies where use occurs, all data products were indicated to be used by an average of just greater than 50% of all respondents on an occasional basis (semi-annual to annual), less than 30% on a frequent basis (daily, weekly or monthly), and less than 20% on an infrequent basis (2 to 5 years or more). Individual averages (use by respondents) for general purpose and frequency of use for each data product are illustrated in FIGURE 3. Additional comments received for section 2 are as follows:

i) general acquisition was not only for municipal use, but for use by citizens, consulting firms, etc. (suburban/rural);

ii) most are very useful for long-range projection purpose, but rarely are they used on a frequent basis (suburban/rural); and

iii) the Province of Ontario provides better data on fertility (regional).

3.3. Respondents were requested to list (Question 3.0.), in any order, the major shortcomings (problems and/or deficiencies) associated with the federal Census (products and services) provided by Statistics Canada. Comments received are outlined in point form, and are distinguished by general source (primarily regional, urban or suburban-rural) as follows:

Regional:

- lengthy time lag between census collection and census publication;
- increasing costs for products and services;
- low frequency of collection (especially for employment data);
- inconsistency of definitions;
- census tracts sometimes do not always relate to neighborhood units, particularly where they straddle the greenbelt and combine urban areas with rural;
- enumeration areas change over time and have no apparent or logical boundaries; and
- some Statistics Canada officers are not attuned to municipal/regional requirements. Incomplete knowledge of their own census products creates confusion and a feeling of uncertainty in dealing with Statistics Canada.

Urban:

- changing definitions and substituting variables;
- lack of timeliness;
- lack of data on employment by place of work;
- lengthy waiting period for availability of census data;
- (lack of a) comprehensible résumé of available information;
- income information and place of work/place of residence information should be collected every 5 years;
- (lack of) economic data: geographic, sectoral and time series detail;
- outdated area boundaries;
- outdated S.I.C. (Standard Industrial Classification) categories; and
- (lack of) land use data.

Suburban - Rural:

- frequency of the census -- annual would be ideal;
- delay in release of data after the census taking;
- enumeration data is sufficiently geographically detailed for local use but boundaries change overtime;
- more local input on enumeration area and census tract boundaries are needed -- there were meetings at the region (RMOC) for the 1981 Census, but would have preferred more direct contact by persons available;
- problems of inaccuracy due to random-rounding;
- (high) costs of data;
- (poor) ease of acquisition;
- information for smaller (rural) communities is not sufficiently/specifically geographically detailed, but aggregated into larger areas.

3.4. Respondents were requested (Question 4.0) to list, by order of relevance, data element names -- variables by sub-group -- found to be most relevant for planning.

All data element names (from section 2.0. of the questionnaire) were to be ranked by the respondent from one to twelve. Where all variables were listed or ranked as equally relevant by respondents, a rank of one(1) was assigned to each. Where variables were neither listed nor ranked as relevant, a rank of twelve(12) was assigned. Ranks per respondent replies were summed for each variable (data element name), then divided again by total number of respondents (relevancy was to be based upon lowest mean rank). The results, indicating mean rank order for data element names, from most to least relevant, are displayed below in FIGURE 6.

FIGURE 6: DATA ELEMENT NAMES MOST RELEVANT FOR PLANNING

Data Element Name	Mean Rank
Demographic	2.67
Population Variables (general population counts)	3.20
Housing Variables (general housing counts)	5.30
Private Household Variables	5.80
Labour Characteristics	6.80
Economic Activity	6.87
Private Occupied Dwelling Variables	6.93
Social/Cultural	8.80
Income	9.20
Census Family Variables	9.47
Education	9.90
Language	10.20

Comparisons between perceived relevance for planning (above) and use of data elements by planners (recall sub-section 3.2.) indicates a number of differences. For instance, census family variables, education and language (data elements) were perceived to be much less relevant for planning than actual usage would indicate. Private household variables, social/cultural and economic activity, on the other hand, were perceived to be of greater relevance to planning than actual usage would indicate.

3.5. Respondents were requested (Question 5.0.) to briefly comment on changes that Statistics Canada could make to improve the utility of products and services as inputs for planners.

3.5.1. In terms of what is/is not collected, individual comments received were as follows:

i) range of data variables are adequate; (regional, suburban-rural);
ii) more than is needed is collected (suburban-rural);
iii) introduction of a couple of new data items would be useful, such as car ownership and mode of travel to work (regional);
iv) should consider the introduction of land use data by standard categories -- commercial, industrial, residential, agricultural, institutional, etc. (suburban, rural);
v) some information should be provided more frequently, such as income, labour force, place of work/place of residence (urban); and
vi) should consider census information combined with specific business data for defined geographic areas, such as per capita investment, incorporations, bankruptcies, corporate migration, etc. (regional).

3.5.2. In terms of the quality of data products provided, individual comments received were as follows:

i) better than needed (suburban-rural);

ii) adequate (regional, suburban-rural);

iii) satisfactory (urban)

iv) need better indexing to geographic location of data, for example, in terms of identifying precise boundary locations (regional); and

v) more detailed geographic distinction is required for villages, hamlets and/or unincorporated settlements (regional, suburban-rural).

3.5.3. In terms of the dissemination of data products and services, individual comments received were as follows:

i) could use more enumeration maps for local manipulation (suburban-rural);

ii) service costs and complexity of accessing data are major difficulties (suburban-rural);

iii) need better public relations plus closer liaison between marketing staff and production units (regional);

iv) one bad experience had been encountered where time estimates for a custom request were poor, as was the geographic quality (regional);

v) satisfactory (urban); and

vi) publication lag is much too long (urban).

3.5.4. In terms of additional services (e.g. software) currently not provided, individual comments received were as follows:

i) not applicable (suburban-rural);

ii) satisfactory (urban);

iii) require suitable software capable of micro-computer access, storage, retrieval and analysis to match smaller agency needs and limitations (regional); and

iv) software needed to make amendments where changes have occured for statistical reporting boundaries (urban).

3.5.5. In terms of other changes which Statistics Canada could make, individual comments received were as follows:

i) more emphasis should be placed on collating and publishing raw data (urban);

ii) consideration should be given to the collection date for greater compatibility with other data sources, for example, year's end as opposed to mid-year (regional).

3.6. Sub-section 3.6 reports upon the findings from question 6.0 of the questionnaire where respondents were requested to rank previously cited census shortcomings on the basis of (1) for very serious, (2) for mildly serious -- where it's recognized as a problem but of limited effect -- or, (3) for not applicable.

The intent of question 6.0 was to have respondents rank previously identified problems for federal census products and services established from the study by Hirsh, (1975), "Marketing Analysis for the 1971 Census of Population and Housing", which was based primarily on comments from users in other federal and provincial agencies. The purpose was to confirm whether such problems were considered relevant at the local level by comparing the findings with those of sub-section 3.3 (where respondents were requested to list their interpretation of major census shortcomings). By making this comparison, it was assumed that respondents should be consistent in their interpretation of Census data deficiencies.

The previously cited census shortcomings (from the Hirsh report) listed for ranking by respondents are as follows:

a) length of time is too long between census takings;
b) length of time is too long between the taking of the census and the reporting of census products;
c) lack of compatibility over time (with other census years);
d) inappropriate boundaries (standard geography);
e) problems for detailed information about small areas (i.e. reliability of data) resulting from random rounding of data;
f) lack of migration and mobility data for small areas;
g) lack of comparability with other data sources;
h) problems created from changing definitions (from different census years);
i) problems created from changing geographic boundaries;
j) high costs in purchasing data;
k) lack of census data in graph or chart form;

l) confusion over which products and services are actually available;

m) lack of geographic (small area) coverage for rural communities;

n) lack of knowledgable people who understand your data needs and lead you to acquire exactly what is required;

o) lack of more data on attitudes, preferences, etc.;

p) insufficient range of data variables; and

q) lack of information on land use within urban areas.

Findings are illustrated in Figure 7 with census shortcomings (products and services) related to the corresponding numeric indexes referenced above, and displayed in terms of frequency of rank occurence (expressed as percentages of all respondents). As evident from Figure 7, only two census shortcomings were identified as serious problems by greater than 50% of all respondents:

a) length of time is too long between census takings (60%); and

b) length of time is too long between the taking of the census and the reporting of census products (60%).

Aggregation of all respondents, however, does not establish a clear understanding of the various perceptions about identified census shortcomings. There are differences depending upon the nature or extent of planning jurisdiction, as shown by Figures 8, 9 and 10. Figure 8 identified that planners at the regional level rate two aspects as posing serious problems:

a) length of time is too long between census takings (60%); and

j) high costs in purchasing data (60%).

FIGURE 7:

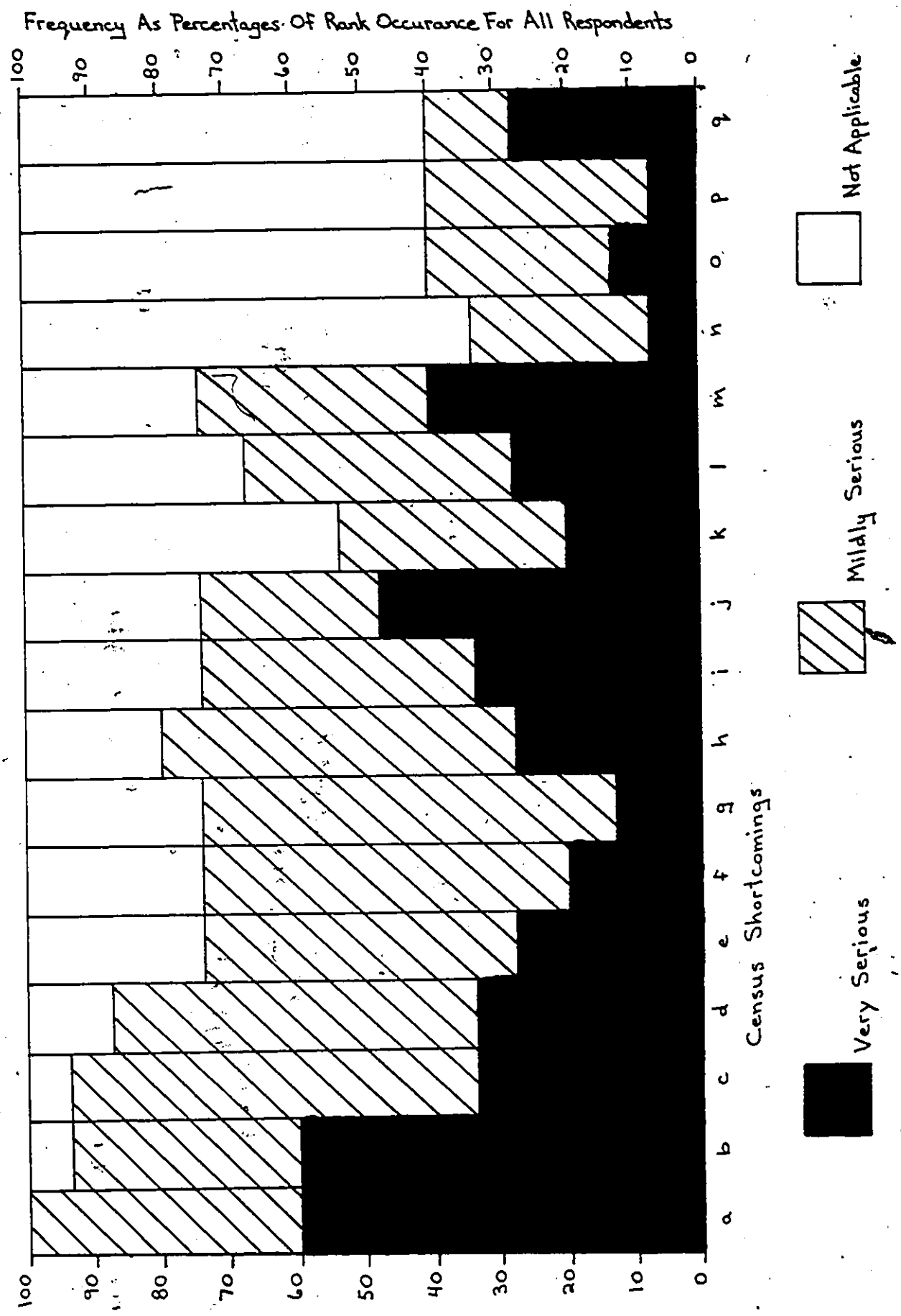
Frequency As Percentages Of Rank Occurance For All Respondents
100
90
80
70
60
50
40
30
20
10
0
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
Census Shortcomings
Not Applicable
Mildly Serious
Very Serious

FIGURE 8:

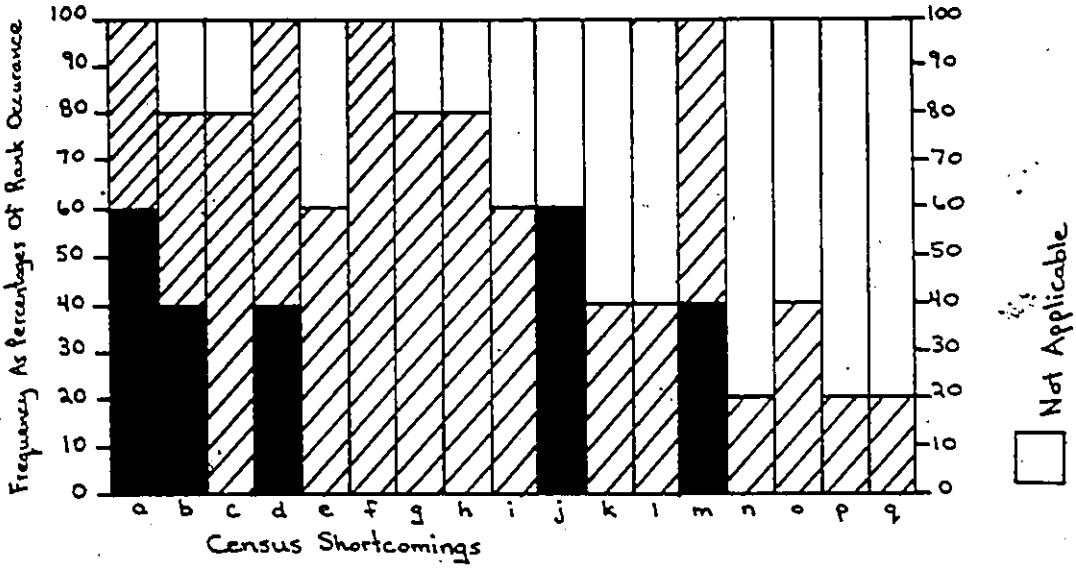

FIGURE 9:

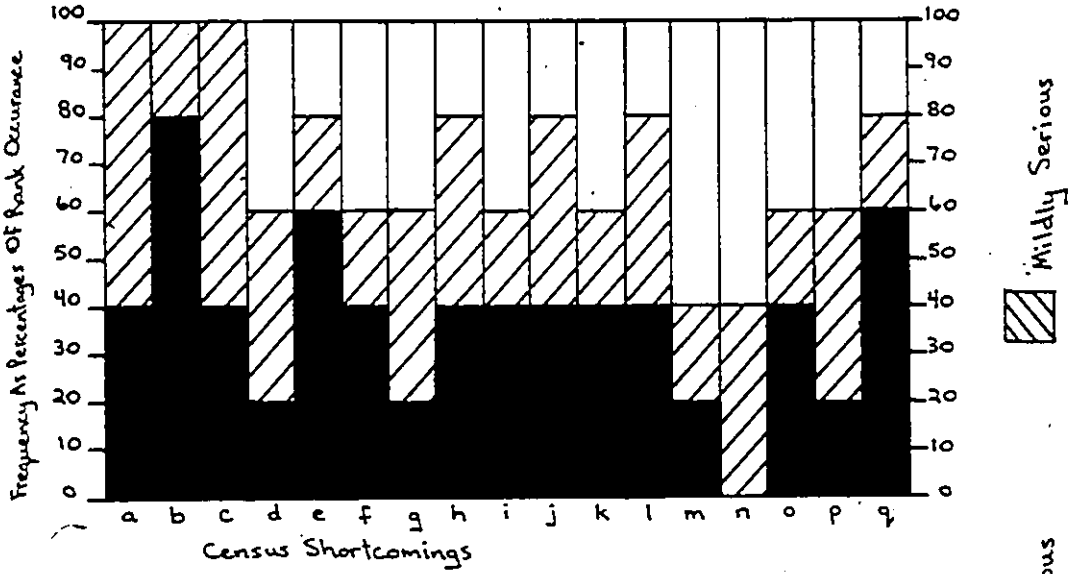

FIGURE 10:

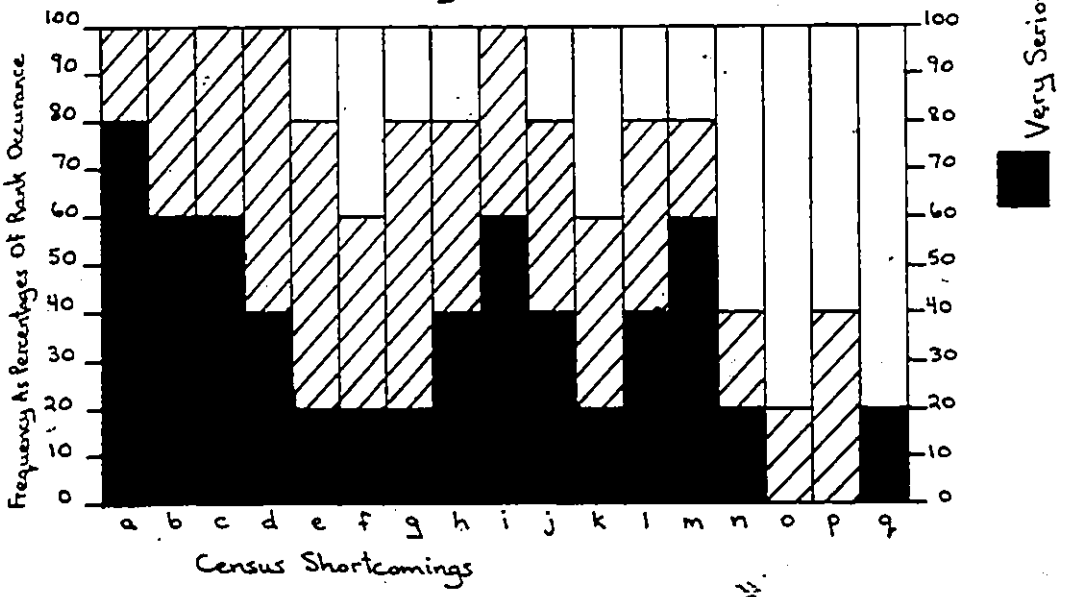

FIGURE 9 identifies that planners at the urban level rate three characteristics as posing serious problems:

b) length of time is too long between the taking of the census and the reporting of census products (80%);

e) problems for detailed information about small areas (i.e. reliability of data) resulting from random rounding (60%); and

g) lack of information on land use within urban areas (60%).

FIGURE 10 however, identifies that planners at the suburban-rural levels are confronted by a more extensive series of problems with Census products and services:

a) length of time is too long between census takings (80%);

b) length of time is too long between the taking of the census and the reporting of census products (60%);

c) lack of comparability over time (with other census years) (60%);

i) problems created from changing geographic boundaries (60%); and

m) lack of geographic (small area) coverage for rural communities (60%).

All other previously identified census shortcomings (problems and/or deficiencies) are therefore not perceived, based on the respondent sample, to be serious problems for local planning either as 1) a collection of all respondents, or 2) within groups of respondents as defined by nature or extent of local planning jurisdiction. In comparison with findings from question 3.0. of the questionnaire component (sub-section 3.3. previous), it is obvious that recognition of census shortcomings and associated degree of severity of

problems, however, are far from unanimous. There were many census shortcomings raised as comments in question 3.0. of the survey-questionnaire, by individual respondents, which were not ranked as serious by 50% or greater of respondents within identified sub-groups. At the regional level, individual comments were raised which apply to census shortcomings b), d), h), i) and n), but were not identified as serious by 50% or greater of all respondents within that sub-group. At the urban level, individual comments were raised which apply to census shortcomings a), d), h), l) and p), but were not identified as serious by 50% or greater of all respondents within that sub-group. At the suburban-rural level, only census shortcoming d) had been raised as an individual comment and not identified as serious by 50% or greater of all respondents within that sub-group. Most, however, were ranked as serious by at least one respondent within each sub-group.

3.7. For Section 7.0. of the questionnaire, respondents were requested to identify general statistical techniques used, versus those not used. Where not used, respondents were requested to indicate why, based upon the categories of reasons provided. In agencies where statistical techniques are used, respondents were further requested to indicate the frequency of use according to the specified time periods. Findings are tabulated in FIGURE 11.

FIGURE 11

7.0 Note whether any of the general statistical techniques listed below are applied by your department or unit to census statistics. For those techniques not used indicate your reasons why according to the categories provided. For those techniques that are used indicate the frequency of application.

	% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
		Reason for non-use				Frequency of use		
	Not used	Inappropriate	Unknown	Too complicated	Used	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
7.1.0 Univariate Analysis								
a) frequency distributions	38	100	-	-	62	25	37.5	37.5
b) mean	38	100	-	-	62	25	37.5	37.5
c) median	54	50	-	50	46	20	20	60
d) mode	75	50	-	50	25	-	-	100
e) standard deviation	92	67	-	33	8	-	100	-
f) analysis of variation	83	80	-	20	17	-	100	-
7.2.0 Bivariate Analysis								
a) Correlation	85	67	-	33	15	-	100	-
b) Regression	69	50	-	50	31	-	50	50
7.3.0 Measures of Association								
a) Pearson's r	85	67	-	33	13	-	100	-
b) Phi coefficient	100	50	33	17	-	-	-	-
c) The percentage difference	69	50	25	25	31	50	50	-
d) Yules Q	100	50	33	17	-	-	-	-
e) Goodman & Kruskal's Tau/Gamma	100	50	33	17	-	-	-	-
f) Contingency coefficient	100	50	33	17	-	-	-	-
g) Guttman's coefficient of predictability	100	50	33	17	-	-	-	-
h) Spearman's rank order correlation	92	50	25	25	8	-	100	-
i) Kendall's rank order correlation	93	37	38	25	8	-	100	-

FIGURE 11 - Continued

	% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
		Reason for non-use				Frequency of use		
	Not used	Inappropriate	Unknown	Too complicated	Used	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
7.4.0 Specific Statistical Tests								
a) single group mean	69	50	33	17	31	25	25	50
b) single group proportion	85	43	43	14	15	50	-	50
c) goodness-of-fit	100	33	44	23	-	-	-	-
d) difference-of-means	92	37	38	25	8	-	100	-
e) difference-of-proportions	92	37	38	25	8	-	100	-
f) analysis of variance (ANOVA)	92	33	44	23	8	-	100	-
g) median test	100	38	50	12	-	-	-	-
h) chi square	92	33	44	23	8	-	100	-
7.5.0 Multivariate Analysis								
a) multiple regression	85	57	14	29	15	-	100	-
b) partial or step-wise regression	85	50	25	25	15	-	100	-
c) principle components analysis	92	50	25	25	8	-	100	-
d) factor analysis	92	50	25	25	8	-	100	-
e) cluster analysis	92	50	25	25	8	-	100	-
f) entropy maximizing techniques	92	44	33	23	8	-	100	-
7.6.0 Non-Parametric Statistical Techniques								
a) the sign test	100	40	40	20	-	-	-	-
b) Mann-Whitney U	100	40	40	20	-	-	-	-
c) the runs test	100	44	45	11	-	-	-	-
d) rank correlation	100	44	33	23	-	-	-	-

FIGURE 11 - Concluded

% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
Not used	Reason for non-use			Used	Frequency of use		
	Inappropriate	Unknown	Too complicated		Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
20	100	-	-	80	42	42	16
100	86	-	14	-	-	-	-

7.7.0 Use of Graphs & Charts for presenting statistical description:
a) manually generated
b) computer-assisted

Based upon the overall findings from Section 7.0. of the questionnaire, it can be stated that the application of general statistical techniques to (federal) Census data is far from a common, unified practice among local planning agencies. Overall non-use of statistical techniques versus use was determined to be widely split, that is, from 85% non-use down to 15% use. Overall reasons for non-use, however, were less distributed, as indicated from the following*:

i) innapropriate or irrelevant for the type of research or operational activities conducted (45 percent);
ii) unknown (33.2 percent); and
iii) too complicated or beyond the human and technical sophistication of the agency in question (21.8 percent).

The only specific (individual) statistical techniques indicated as used by greater than 45% of all respondents were frequency distributions, mean, and median, all of which are univariate analysis techniques. Regression (a bivariate analysis technique), percentage difference (a measure of association) and single group mean (a specific statistical test) came a distant fourth (tied at 31%) in terms of indicated use expressed as a percentage of all respondents replies.

Where used, most statistical techniques were applied on an occasional basis. Further, 80% of all respondents indicated use of manually-generated graphs and charts for the presentation of statistical descriptions. No respondents indicated use of computer-assisted means for the generation of graphs and charts, including those previously identifying access to and use of

* The distinction between inappropriate and too-complicated is identified as follows:
Inappropriate - where such techniques might be regarded as irrelevant to the type of research or analytical studies conducted within a department or agency.
Too-complicated - where such techniques might be regarded as beyond the human and technical sophistication of that department or agency.

computing facilities. In addition, and consistent with earlier findings related to data use, respondents previously indicating access to and use of computing facilities reported the use of a much broader range of statistical techniques than those without access to such facilities.

3.8 Respondents (Section 8.0. of the questionnaire) were requested to identify specific planning-related methods and techniques either used or not used within their agency. Where not used, respondents were requested to indicate why using the categories provided. Where methods and techniques of analysis were used, respondents were requested to indicate the frequency of use as per the categories provided. Findings are tabulated in FIGURE 12 for sub-section 8.1.0 (Projection and Simulation Techniques), in FIGURE 13 for sub-section 8.3.0 (Spatial Interaction/Allocation Models), and, in FIGURE 14 for sub-section 8.5.0 (Evaluation Methods and Techniques).

3.8.1 Section 8.1.0 of the questionnaire attempted to establish the use (see FIGURE 12) of Projection (Forecasting and Simulation Techniques), which were further divided into the following research categories:

1) Population
2) Economic Activity
3) Housing, and
4) Integrated Forecasting Techniques for Land Use Projection (population and employment and/or housing)

3.8.1.1 For the population research category, trend extrapolation and ratio techniques were indicated as used by greater then 50% of all respondents (69% and 54% respectively) with frequency of use indicated, primarily, on an occasional basis. Matrix methods (such as the cohort survival technique) came a distant third with a response rate for use

FIGURE 12

8.0 The following methods and techniques are illustrative of those used in planning situations. Indicate whether they are used by your agency, and if so, the frequency of use. If not used, indicate your reasons why according to the categories provided.

	% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
		Reason for non-use				Frequency of use		
	Not used	Inappropriate	Unknown	Too complicated	Used	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
8.1.0 Projection (Forecasting) and Simulation Techniques:								
8.1.1 Population								
a) trend extrapolation	31	33	33	33	69	22	56	22
b) linear models (including linear programming, exponential & S-shaped or gompertz)	71	-	72	28	29	25	75	-
c) ratio-techniques (eg. best fit)	46	25	50	25	54	14	72	14
d) matrix methods (eg. cohort-survival)	62	50	-	50	38	40	40	20
e) gaming techniques (eg. Monte Carlo)	92	25	25	50	8	-	100	-
f) Markov Chains (eg. probabalistic)	92	25	25	50	8	-	100	-
g) social area analysis/urban factorial ecology	83	33	-	67	17	-	100	-
8.1.2 Economic Activity								
a) location quotient	83	50	-	50	17	-	50	50
b) economic base	67	50	-	50	33	-	75	25
c) multiplier/linkage-type analysis	83	33	33	33	17	-	100	-
d) input-output analysis	83	40	20	40	17	-	100	-
e) shift-and-share analysis	100	50	25	25	-	-	-	-
f) commodity-activity analysis	100	75	-	25	-	-	-	-
g) econometric models (with regression)	92	50	25	25	8	-	100	-
h) technique for area planning (TAP, ie. a modified input-output/location quotient technique)	100	67	-	33	-	-	-	-

8.1.3 Housing
- a) headship rate model
- b) household distribution model
- c) housing allocation model
- d) rent model
- e) residential density model

8.1.4 Integrated Forecasting Techniques for land use projection (ie. population and employment and/or housing)

FIGURE 12 - Concluded

% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
	Reason for non-use				Frequency of use		
Not used	Inappropriate	Unknown	Too complicated	Used	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
50	-	50	50	50	-	100	-
67	-	67	33	33	-	100	-
67	33	33	33	33	-	100	-
83	25	50	25	17	-	100	-
75	25	50	25	75	-	100	-
45	100	-	-	55	-	67	-

at 38%, and equally split between frequent and occasional in terms of frequency of use. All respondents indicating use of the cohort survival population projection technique (recognized in the planning literature as one of the more valid and reliable techniques for such purposes) were employed by either the City of Ottawa or Regional Municipality of Ottawa-Carleton planning departments. Respondents from planning and technical services for the Communauté Régionale de l'Outaouais (the regional planning authority for the Quebec side of the Ottawa-Hull area) did not indicate the use of any population projection techniques, nor any other statistical and/or planning related methods and techniques for that matter. No other population projection techniques were indicated as used by greater than 30% of all respondents; however, each technique listed was indicated as used by at least one respondent. Primary reasons for non-use where indicated by respondents, were fairly evenly distributed between inappropriate, unknown and too complicated, with too complicated holding a slight overall edge. Spaces were provided wherein respondents could identify "other techniques", not listed, which they had used in their research. In this regard, one respondent identified the use of modified population extrapolation (using post-growth, demographic trends and land capacity), on an infrequent basis.

3.8.1.2 For economic activity, no techniques listed were indicated as used by greater than 50% of all respondents. Economic base analysis was indicated as used by 33% of all respondents, primarily on an occasional basis. All other economic activity techniques were indicated as used by less than 20% of all respondents, with no indicated use for shift-and-share or commodity-activity analysis techniques. Further, no "other" economic activity-related techniques were identified as used

by any respondent. General lack of use for economic activity analysis techniques corresponds with the previously identified low response rate for use of economic activity related data (sub-section 3.2 of this report) which may suggest any one of the following reasons (or combinations thereof) for such limited use:

i) lack of consideration or appreciation for the impacts of the economic sector (economic activities) as it pertains to local planning matters;
ii) lack of appropriate and usable economic activity-related methods and techniques for local area analysis; and/or
iii) lack of appropriate economic activity data for local area analysis.

3.8.1.3 For housing studies, 50% of all respondents indicated use of both the household distribution and housing allocation models, 25% for the residential density model, and 17% for the rent model. All respondents, where applicable, indicated use of such housing-related projection techniques on an occasional basis. Reasons for non-use were primarily indicated as unknown. One respondent further indicated the use of simple "non-scientific" description, analysis and projection approaches for studies of housing starts, structural type, and tenure.

3.8.1.4 Fifty-five percent of all respondents indicated the use of integrated forecasting techniques for land use projection, with frequency of use identified as occasional by 67% of those respondents and infrequent by the remaining 33%. Where indicated as not used, respondents identified the use of such techniques as inappropriate for general application. The generally high response rate for use of integrated forecasting techniques, however, does not correspond to the much lower indicated use of multivariate statistical analysis techniques and measures of association required for scientific application of such techniques.

3.8.2 Question 8.2.0 of the questionnaire was included for the purpose of providing respondents an opportunity to comment on the utility of any or all of the projection (forecasting) and simulation techniques. Comments received are listed as follows, and are aggregated where duplication of response occurred:

i) some of the projection techniques "may" be used periodically in an "unsophisticated" manual approach (suburban-rural);

ii) population, employment and labour force statistics are very important for official plan monitoring and review, but "sophisticated" techniques are generally not used because of difficulties in interpreting the results to administrators and politicians (regional);

iii) lack of personnel, time, or the technical facilities (computer) preclude use of any rigorous techniques (suburban-rural);

iv) most techniques are too sophisticated or unknown for the size of operation and limited staff resources (urban, suburban-rural); and

v) it is necessary to use techniques that give meaningful results, that can be understood by politicians, and that make use of available data; therefore, it is more useful and relevant to apply descriptive techniques to Census data, and rely on personal judgement and the literature to provide relationships (regional).

3.8.3 Section 8.3.0 of the questionnaire (see FIGURE 13) attempted to determine the use of spatial interaction/allocation models, including techniques relevant to studies of combined transportation/land use relationships. It should be pointed out that the refusal to

FIGURE 13:

	% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
		Reason for non-use				Frequency of use		
	Not used	Inappropriate	Unknown	Too complicated	Used	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
8.3.0 Spatial Interaction/Allocation Models								
a) gravity models	71	50	-	50	29	25	75	-
b) spatial interaction models	93	50	17	33	7	-	-	100
c) spatial distribution models	100	50	17	33	-	-	-	-
d) intervening opportunities model	86	60	-	40	14	-	50	50
e) origin/destination analysis	79	50	-	50	31	33	67	-
f) traffic assignment models	79	50	-	50	31	33	67	-
g) trip distribution models	79	50	-	50	31	33	67	-
h) trip generation models	86	60	-	50	14	50	50	-
i) EMPIRIC or PLUM (econometric type land use models)	100	28	29	43	-	-	-	-
j) Urban Development Models (dynamic programming, Lowry-Garin type deterministic models, ie. combined land use/transportation)	100	28	29	43	-	-	-	-

participate in this survey by the Transportation Planning Department, Regional Municipality of Ottawa-Carleton, seriously limits any judgements which might have been applied to the results from this section. Origin/destination, traffic assignment and trip distribution models (as evident from FIGURE 13) were indicated as used, respectively, by 31% of all respondents; 20% indicated use of gravity models; 14% indicated use for each of the intervening opportunities and trip generation models; and, 7% indicated use of spatial interaction models. No use was indicated for spatial distribution models, econometric type land use models (such as EMPIRIC or PLUM), or Urban Development Models. Where models were used, most respondents indicated frequency as occasional. Where not used, respondents indicated their reasons for non-use as either inappropriate or too complicated. No "other" models (or techniques) were indicated as used beyond what had been listed.

3.8.4 Question 8.4.0 of the questionnaire was included for the purpose of providing respondents an opportunity to comment on the utility of any or all of the spatial interaction/allocation models. Comments received are outlined as follows:-

i) required expertise for conducting such analysis is not available in-office; therefore, consultants would be hired if required, especially since need would only be on a very infrequent basis (regional, suburban-rural);

ii) most techniques are too sophisticated or unknown for the size of operation and limited staff resources (urban);

iii) problems are encountered attempting to translate Census data to the transportation based geographic network, that is, for traffic zones, districts, etc. (regional);

iv) above techniques are viewed with considerable skepticism when it comes to municipal planning (urban); and

v) the benefits to be derived from attempting to use such complicated models would not be significant enough to warrant their application (urban).

3.8.5 Section 8.5.0 of the questionnaire (see FIGURE 14) attempted to determine the use of formalized evaluation methods and techniques. Only judgement and ranking were indicated as used by greater than 50% of all respondents, that is, 64% and 57% respectively. Twenty-nine percent of all respondents identified the use of cost-benefit analysis, while 21% indicated use of goals achievement matrix and critical path analysis. Fourteen percent identified use of the planning balance sheet method whereas cost minimization, PPBS/MBO (Planning Programming Budgeting Systems/Management by Objectives), threshold analysis, and urban development models were indicated as used by only 7% of all respondents. Robustness testing methods, AIDA (associated interconnected decision areas), potential surface analysis, and development potential analysis were not indicated as used by any respondent. Further, no "other" evaluation methods and techniques were indicated as used by any respondent. With the exception of judgement, which was indicated to be used on a frequent basis by 56% of those respondents indicating such use, most evaluation methods and techniques were indicated to be applied on an occasional basis. The majority of respondents not using such methods and techniques suggested, as reasons for non-use, that

FIGURE 14:

8.5.0 Evaluation Methods and Techniques

a) judgement
b) ranking
c) cost-benefit analysis
d) cost minimization
e) goals achievement matrix
f) planning balance sheet
g) PPBS/MBO
h) robustness testing methods
i) AIDA (associated interconnected decision areas - a linkage type analysis employing a Strategic Choice approach)
j) potential surface analysis
k) development potential analysis
l) threshold analysis
m) critical path analysis
n) Urban Development Models.

% of all respondents	% of those respondents who do not use them			% of all respondents	% of those respondents who do use them		
	Reason for non-use				Frequency of use		
Not used	Inappropriate	Unknown	Too complicated	Used	Frequently (daily/ weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
36	50	-	50	64	56	44	-
43	50	-	50	57	-	88	12
71	50	-	50	29	-	50	50
93	40	-	60	7	-	100	-
79	33	-	67	21	-	66	33
86	25	25	50	14	-	50	50
93	50	-	50	7	-	-	100
100	20	40	40	-	-	-	-
100	20	40	40	-	-	-	-
100	25	25	50	-	-	-	-
100	25	25	50	-	-	-	-
93	25	25	50	7	-	-	100
79	50	-	50	21	-	66	34
93	25	25	50	7	-	-	100

such evaluation methods and techniques were too complicated for general application, followed by indications of inappropriate. A number of respondents further indicated many evaluation methods and techniques as unknown to them.

3.8.6 Question 8.6.0 of the questionnaire was included for the purpose of providing respondents an opportunity to comment on the utility of any or all evaluation methods and techniques. Comments received are outlined as follows:

i) in the past, because of the limited number of permanent planning staff, special research and analysis projects have been contracted out to specialized private consulting firms (regional);

ii) such "formalized" techniques would generally not be used except, perhaps, on a very informal basis only (suburban-rural);

iii) subjective assessments are usually more valid because of the difficulties in attempting to derive the economic and social benefits of various alternative plans and proposals using quantitative measures, the results of which are difficult to interpret in a meaningful way (regional);

iv) computing resources are not available to undertake these types of analyses which, in any event, have little relevancy for predominantly rural areas still plagued by many data capture problems (suburban-rural); and

v) the benefits for using such techniques would be less than the costs required to apply them (urban).

3.9 Question 9.0 of the questionnaire was included for the purpose of identifying statistical and planning-related methods and techniques used by local government planners, and the corresponding census data items such methods and techniques normally involve during application.

Question 9.0. was perceived by many as being a little too much to ask for, as it required the devotion of more of their time than many were willing to offer. As a result, in terms of the total number of respondents, it was poorly attempted whereby just less than 30% of all respondents even attempted to complete it. Based on the results where efforts were attempted, Census data are cross-referenced to many analytical methods and techniques that are applied by local government planners in FIGURE 15. In FIGURE 15 where the use of a particular method or technique was identified by more than one respondent, the Census data items have been aggregated. The application of a particular method or technique may not necessarily involve all data items listed, but combinations of various data items, depending upon the situation at hand or specific purpose of the analysis.

Figure 15: CENSUS DATA CROSS-REFERENCED TO ANALYTICAAL METHODS AND TECHNIQUES APPLIED BY LOCAL GOVERNMENT PLANNERS

DATA PRODUCTS - (FEDERAL) 1981 CENSUS OF POPULATION AND HOUSING

Analytical Methods and Techniques	Demographic: Population Counts	Age	Sex	Marital Status	First Marriage: age/date	Fertility	Mobility Status	Family Status	Social Cultural: Place of Birth	Immigration age/date	Citizenship	Ethnicity	Religion	Language: Mother Tongue	Home Language	Official Language	Education: School Attendance	Highest Grade	Number of Years	Highest Degree	Economic Activity: Labour Force Activity	Weeks worked	Hours worked	Labour characteristics: Place of work	Industry	Occupation	Class of worker	Income: Total income	Wages and salaries	Self-employment	Transfer payments	Private Occupied Dwelling: General Housing Counts	Structural type	Period of Construction	Number of Rooms/ Bathrooms	Heating Equipment	Need of Repairs	Value	Fuel Used	Private Household Variables: Tenure:Owned/Rented	Length of Occupancy	Type of Household: Family/non-family	Rent: cash/gross"	Rent to Income Ratio	Owner's Expenditure	Owner's Expenditure to income ratio	Crowding Index	Household Income	Census Family variables: Type of Family:Husband-wife/lone parent	Number of children	Family Income	Characteristics of family members
Frequency distribution	•	•	•	•	•	•	•	•						•	•	•					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mean	•	•	•	•	•	•	•	•																																								
Trend Extrapolation	•	•	•	•	•	•	•	•				•		•	•	•			•	•	•			•	•	•	•	•	•		•	•	•	•		•		•	•	•	•			•		•	•	•
Matrix Methods (Cohort-survival)	•	•	•	•	•	•	•	•																																							
Social Area Analysis/ Urban Factorial Ecology	•	•	•	•	•			•	•			•	•	•	•		•	•	•	•	•																	•					•							
Economic Base Analysis							•														•	•	•	•	•	•	•	•	•	•				•															
Headship Rate Model	•	•	•	•	•			•																•							•	•			•				•		•					•			
Household Distribution Model	•	•	•	•																											•														•			
Housing Allocation Model																																•							•		•							
Integrated Forecasting Techniques	•	•	•				•														•			•								•	•						•		•					•	•	

3.10 Question 10.0 of the questionnaire was included for the purpose of attempting to establish, for local area analysis, desired data products for use as descriptive indicators on an annual basis. In this regard, respondents were requested to identify desired data products if they were required to conduct analysis for the preparation of annual reports, commenting, in a "monitoring-like-fashion", on the status for and impacts of the previously adopted land-use plan (to indicate whether or not progress was being achieved in pursuit of the plan's objectives). During the interviews the question was further clarified in that desired data products were not confined to existing federal Census products, but could include any other data (information) that respondents regarded as pertinent to such a report. It is notable, as established during the interviews, that existing local planning agencies in the Ottawa-Hull area are not required to perform such an annual monitoring function on any formal basis; however, respondents with the Regional Municipality of Ottawa-Carleton Planning Department, Policy Program Division, did indicate impending movement towards such a function as part of their regular planning operations in the not-too-distant future.

Desired data products as identified by respondents are listed as follows with no specific emphasis on order of importance:

i) Population counts (regional, urban, suburban-rural);
ii) Demographic characteristics (regional, urban, suburban-rural);
iii) Education characteristics (urban)
iv) Economic activity (regional, urban);
v) Labour characteristics (regional, urban);
vi) Income characteristics (urban);
vii) Housing counts (regional, urban, suburban-rural);
viii) Private occupied dwelling variables (regional, urban, suburban-rural);
ix) Private household variables (urban, suburban-rural);
x) Census family variables (suburban-rural);
xi) Building permits issued/Building completions (suburban-rural);
xii) Building permit values (suburban-rural);
xiii) Land supply (Residential/Commercial/Industrial/Institutional/Serviced and Unserviced) (suburban-rural);
xiv) Land consumption (from/to) based on standardized land use categories (regional, suburban-rural);
xv) Density by neighbourhood (for residential floor space by land area) (urban);
xvi) Place of work versus Place of residence (regional, urban); and
xvii) Employment by occupational categories (regional, urban).

3.11 Question 11.0 was intended to establish whether federal Census products were perceived by local government planners to take sufficient account of local conditions which may be of significance to local area analysis in planning. The response was fairly evenly distributed, with 53% indicating yes and 47% indicating no.

Additional comments received, on the favourable side, are as follows:

i) the initiation of geocoding has been a substantial improvement in the major urban centers (urban); and

ii) given the sources used to obtain data and the overall volume of data collected, Statistics Canada produces a fairly good product (suburban-rural).

Additional comments received of a less favourable nature regarding the account taken of local conditions, are as follows:

i) they're rather old fashioned in tackling a country the size of Canada, and should contact the Swedish Bureau of Census regarding their procedures (urban);

ii) insufficient account of local conditions because of the limited frequency of census-taking, the slow speed of availability, and the lack of current local input to determine enumeration area and census tract boundaries (suburban-rural);

iii) lack of sufficient detail resulting from confidentiality requirements (urban);

iv) there is too much reliance on Census Metropolitan data for the Ottawa-Hull area such that something similar to the Census Metropolitan Atlas series at the Census Division level would be preferred (regional);

v) data is aggregated into large geographic areas with insufficient account of small rural communities (suburban-rural); and

vi) previous preparation of exhaustive recommendations for census tract boundaries were not taken into account (regional).

3.12 Question 12.0 attempted to establish perceptions and comments on time allocation as it concerned the collection and compilation of data from a variety of different sources.

a) 71% indicated yes while 29% indicated no as to whether time for collection and compilation activities was considerable, not including time spent for analysis of data.

b) The overall mean score for respondents for proportion of time spent on such functions was established at 13.6%, with a standard deviation of 22.5849; which means that there exists a wide-ranging difference in individual time spent on such activities (a range of as much as 22.5%).

c) 55% indicated that data collection and compilation from a variety of different sources was a productive way to spend their time, whereas the remaining 45% indicated it as non-productive.

d) Further comments received are outlined as follows:

i) time allocation for such activities fluctuates depending upon population growth in the area (suburban-rural);

ii) hand compilation is time consuming and could be replaced by computer processing (regional);

iii) it's not a productive way to be spending one's time but it is essential (regional);

iv) do not have the necessary resources to do this work, therefore it does not get done (suburban-rural);

v) such time allocation is necessary and therefore productive (urban);

vi) there is good learning in collecting and compiling data, therefore it's productive (urban); and

vii) time allocation problems result because of other internal problems, mainly lack of political and budgetary commitments for proper resources; therefore, the work is rarely ever done properly (regional).

The results suggest a mixed range of perceptions concerning time allocation with most admitting such activities did require considerable amounts of their time. Respondents were divided, however, as to whether or not it was time productively spent: depending upon whether human resources were available for doing such work; or, whether it was a required (necessary) part of their individual work activities.

3.13 Question 13.0 attempted to continue along the lines of question 12.0 by gathering further perceptions regarding time allocation. In this regard, respondents were requested to identify whether their time could be allocated more effectively on analysis and other relevant planning matters if all relevant data could be obtained to required specifications from a national data clearinghouse. Respondents were additionally requested to comment on the feasibility of developing the national data clearinghouse concept and, if favourable towards such an idea, to further identify any other data products (or sources external to the federal Census of Population and Housing) which should be interrelated and made accessable.

a) 71% of all respondents indicated that their time could be allocated more effectively on local area analysis and other planning matters if all relevant data could be obtained to their specifications from a national data clearinghouse.
The remaining 29% indicated no;

b) Respondents were equally divided, however, in terms of favouring or opposing the idea of establishing such a national data clearinghouse with 50% in favour and 50% opposed;

c) Comments received from those opposed to the idea are outlined as follows:

i) I don't think that the federal government would do a proper job since they are already too slow in releasing Census data (urban);

ii) it would not work effectively (urban);

iii) I question whether one agency could do both an effective and efficient job (suburban-rural).

iv) it would be unrealistic to expect (suburban-rural).

v) it would make little difference to our agency because the current time allocation problems are internal resulting from the lack of political commitments for proper resources (regional).

Comments received from those in favour of such an idea are outlined as follows:

i) favour because of the potential cost-effectiveness, standardization and elimination of much duplication of effort (regional);

ii) would have to deal with one agency only (regional);

iii) would favor the proper integration of data sets (regional);

iv) would favour the more efficient search and retrieval of required information (suburban-rural); and

v) potential economy of time (urban).

d) Those respondents in favour of the idea of establishing such a national data clearinghouse suggested the following as potential data products/sources, of relevance to local area analysis, which might be accessed and interrelated.

i) Provincial Assessment data for land area, frontage, tenancy, assessed value, residence, and improvements to the land (regional, suburban-rural);

ii) Land use information by standardized categories (regional, urban, suburban-rural);

iii) Revenue Canada Taxation (income) plus Health and Welfare (old age pension) data (regional);

iv) Revenue Canada data on mobility, income and employment (regional);

v) Real Estate data for housing prices/values, number of sales, etc. (Regional);

vi) Income data by smaller planning districts (suburban-rural).

3.14 Question 14.0 of the questionnaire sought comments on the perceived relevance and uses for planning that administrative records -- linked to a suitable and compatible geographic base -- could serve. Examples were provided on the questionnaire; examples which included potential data derived from income tax, unemployment insurance, family allowance, old age pension and welfare administrative records. Comments received are outlined as follows:

i) do not see any additional needs from this area (suburban-rural);

ii) it might help to provide annual estimates for population, demographic characteristics, income, housing, households, and families (regional, suburban-rural);

iii) it could be useful for migration/mobility studies (regional);

iv) it could be useful if cross-referenced to Census data (suburban-rural);

v) it could be helpful for housing and recreation planning in terms of assessing needs (suburban-rural);

vi) it may have potential for providing more up-to-date information on demographic and economic trends (urban); and

vii) it might be helpful for evaluating the need for social-assisted housing, that is, for families, non-families and seniors, etc. (regional, suburban-rural).

3.15 For question 15.0, respondents were asked to comment on the potential use/utility of the postal code as a geographic locator for small area statistics derived from administrative data records. Comments received were both favourable and unfavourable.

Unfavourable comments received are outlined as follows:

i) it would not work in the rural areas and therefore would not provide complete coverage (suburban-rural);

ii) the geography would be difficult to maintain (regional);

iii) there is no doubt there would only be problems in the rural areas and in keeping the data up-to-date on a consistent basis (regional);

iv) postal codes represent mail volume and not planning districts, therefore it would not be very useful to us (suburban-rural); and

v) postal codes do not always reflect political/administrative boundaries, therefore it might only create more problems than it's worth (urban).

Favourable comments received are outlined as follows:

i) it could be useful in smaller communities where small area geographic coverage is not currently provided (suburban-rural);

ii) it may be useful for marketing analysis studies, plus for targeting population characteristics when conducting a stratified survey (urban); and

iii) it could help to overcome the problem of differing boundaries as long as a conversion procedure was readily available (regional).

4.0 OVERVIEW

The purpose of this section is to provide a general overview for the survey findings including the highlights of the questionnaire findings, identified respondent inconsistencies, and observations from the back-up interviews.

4.1 Review of the Questionnaire Findings

The following points serve as highlights of the findings from the questionnaire:

1. In general, acquisition and use of federal census products and services for descriptive purposes by local government planning agencies in the Ottawa-Hull area is quite extensive. Their use for analytical and forecasting purposes, however, based on differences identified in comparison of FIGURES 11 to 15 with FIGURE 3, is less than was originally indicated. The majority of the planning agencies surveyed appear to relie upon traditional (manual) methods for storing, manipulating and applying census data for their planning operations. This statement is based on the following findings:

   1) acquisition of census data by ink-print publications for standard geographic areas, as opposed to custom tabulations and/or special requests for non-standard geographic areas;
   2) on relatively low use of products on microfiche, user summary tape, and services through CANSIM;
   3) on the overall current and perceived lack of dependence on computer resources; and,
   4) on the continuation of simplified research by manually calculated methods for data observation and analysis.

2. Complaints and criticisms about federal Census products and services are primarily temporal in nature (length of time between census takings, and between the taking and reporting of census products), as expressed by the majority of all respondents. Where distinctions are provided, however, depending upon nature or extent of planning jurisdiction (regional, urban, suburban-rural), more localized complaints have been identified. That is, at the regional level, further complaints were raised against the cost of purchasing data products (sub-section 3.6.), and against the cost and quality of data services (sub-section 3.1). At the urban level, other complaints were raised concerning the problems for detailed information about small areas (reliability of data) resulting from random rounding procedures, and, about the lack of information on land use within urban areas (sub-section 3.6.). And, finally, at the suburban-rural levels, complaints were raised concerning the lack of comparability over time with other census years, the problems created from changing geographic boundaries, and the lack of geographic (small area) coverage for rural communities.

3. Recognition of the need for greater standardization criteria and subsequent improvements for compatibility with other data sources was widespread, but such recognition was far from unanimous. Further, many respondents identified their situation as seriously lacking in human and technological resources resulting from lack of political and budgetary commitments. The significance of this situation is such that much essential work simply is not carried through as desired, leaving many planners ill equipped to identify data needs which might be satisfied at the federal level as opposed to local.

4. A number of respondents expressed desires for better physical and/or land statistics type data, as they apply to urban areas. At the same time, however, there was a great deal of apprehension over whether the federal government in general, and the Census in particular, were the appropriate sources/means for collecting and disseminating such data.

5. Many indications of the need for more timely economic activity and employment related data were expressed. On the other hand, however, there was also an identified current lack of attention to the same by local planners in terms of overall data and methods and techniques used (discussed below).

6. Many respondents indicated their continued preference for the use of more simplified traditional methods and techniques more readily understood at the administrative and political levels. As a consequence, the range of application of scientific methods and techniques are relatively small, with little overall consensus or commonality across agencies in terms of what is used. The greater range of methods and techniques used appears to be highly dependent upon political and budgetary commitments, and human and technological resources (in terms of size of staff and availability of computing facilities).

7. Respondents were equally divided over the idea of the establishment of a national data clearinghouse. The range of comments received appeared, however, to be greater in terms of potential benefits to be accrued from such a national data clearinghouse than the arguments presented against. Further, respondents in general did not appear overly enthusiastic about the potential use of administrative data records as a supplement to the census, or for the use of postal codes

as geographic identifiers, even though considerable "food for thought" was put forward in terms of potential benefits and/or problems for each. The reasons for the overall lack of enthusiasm is due to previously identified apathy and frustration resulting from the general lack of political and budgetary commitment to provide sufficient human and technological resources. Many respondents indicated that insufficient resources were available to make full use of existing products and services, and as a result they were really in no position to demand more than is currently provided.

4.2 Identified Respondent Inconsistencies

A detailed overview of the survey findings identified a number of inconsistencies across various sections of the findings from the questionnaire, which places serious questions over the general validity and relevance of many of the findings. Specific inconsistencies in question are identified as follows:

i) between the number of respondents indicating general purpose of use of Census data (section 2.0 as evidenced from Figure 3), and the number of respondents identifying specific methods and techniques used (sections 7.0 and 8.0 as evidenced from FIGURES 12 and 13). In this regard, respondents (in Section 2.0) had indicated that a majority use Census data for analysis of relationships, however, few respondents actually indicated use of methods and techniques designed for such analytical purposes, as discussed in sub-section 3.8.1.4.

ii) between the number of respondents indicating the use of planning-related methods and techniques (FIGURES 12, 13 and 14), and the num-

ber of respondents indicating the use of statistical techniques (FIGURE 11) generally used in conjunction with or as part of a number of planning-related methods and techniques. An example would be that previously discussed in sub-section 3.8.1.4 where a majority of respondents had indicated the use of integrated forecasting techniques, but less than 16% in all cases identified the use of multivariate analysis techniques required for such purposes.

iii) between those methods and techniques indicated as used (FIGURES 12 and 13), and the range of methods and techniques identified to corresponding data items (as part of question 9.0 of the questionnaire, and presented here in sub-section 3.9.); and

iv) between the individual comments and requests for more timely labour force and income data related to economic activities identified throughout various sections of the questionnaire findings, and the indicated use of economic activity-related data plus methods and techniques of analysis (from sections 2.0., 7.0., 8.0. and 9.0. of the survey-questionnaire, and evidenced here in Figures 3, 11, 12, 13, and 14, plus sub-section 3.9.).

In all likelihood, reasons for the final inconsistency (iv above) stems from the division of expressed opinion between the minority of respondents indicating the lack of more relevant and timely economic data as serious census shortcomings, and the greater number of respondents generally apathetic towards the need for changes or improvements in general. Reasons for inconsistencies i), ii), and iii) cannot, unfortunately, be derived from the responses received and interviews held during the study. A follow-on exercise would therefore be required to identify explanations in this regard.

4.3 Additional Observations From The Interviews

In general, most interviews initially required some clarification or discussion of specific questions/sections of the questionnaire. Also, a few objections were explicitly raised about the length of the questionnaire, despite the fact that it had been subjected to the three design evaluation procedures (pilot study, pretest and trial run) before being administered. As a result, there are grounds for doubts about some of the respondents in terms of how careful they were while completing each question/section. This "concern" may have relevance to the inconsistencies that appeared in various areas of the research findings discussed in sub-section 4.1 above.

A number of respondents raised further concerns about the presentation of data products (as listed in the questionnaire) which applied to the 1981 census, even though many were not yet available for release at the time the survey was conducted. These very same respondents subsequently indicated their lack of awareness of a few of the data products, meaning that they were unable to adequately respond as to whether they would use them, or the perceived frequency of use. An example in this regard is the crowding index.

It was also observed while conducting interviews that many respondents were apathetic towards changes which Statistics Canada might make that would be of positive relevance for local planning operations. In a similar vein, many expressed the opinion that Statistics Canada does a relatively good job considering the enormity of the task, and did not expect the level of detail required for local area analysis because of

the federal Census mandate. As a result, great difficulty was experienced attempting to get respondents to adjust to a futures mode of thinking in terms of what Statistics Canada "should" be providing that is not currently available.

Further, and particularly as it applies to the smaller, more suburban-rural agencies, it became apparent during the interviews that little appreciation and attention were paid to the methods and techniques component of the questionnaire. Presumably it was assumed that without access to computers such methods and techniques were inappropriate for general use, and far too complicated to be of relevance, particularly if decision-makers were mystified by their use. In addition, problems were experienced attempting to get respondents to think in terms of desired services rather than just products, a task made even more difficult since so few respondents were knowledgable of computer-assisted methods for data storage, maintenance, retrieval and analysis. Respondents' pre-occupation with existing data products appears to stem from their use of and acquaintance with traditional methods (which depend on the data available) and associated requests for better and more timely data for the methods already in use.

Two other observations evident from the interviews brought to light the following:

i) the existence of an identifiable area network of persons across the various planning agencies, wherein data and knowledge of available products and services are exchanged; and

ii) the existence, in a number of situations, of direct personal contact, between production officers within Statistics Canada and local planners seeking data products and services.

Respondents from RMOC expressed little confidence for Statistics Canada services as result of a bad experience with a custom request (as previously identified in the findings from the questionnaire). Also evident from the interviews of officials from planning agencies with relatively small budgets, were animosities towards Statistics Canada's policies of cost recovery for products and services. Many local planners held the opinion that the taking and reporting of the federal Census of Population and Housing was a public good paid for through the federal taxation system, and that it was unfair in return to have to pass the burden of those costs on to the local property owners and tax payers.

Only respondents from the City of Ottawa and Regional Municipality of Ottawa-Carleton planning departments indicated perceived and/or impending movement towards the development and implementation of inter-agency corporate planning strategies. The remaining, smaller planning agencies perceived themselves primarily as fulfilling required administrative services for the local populace. The implementation of computing resources and subsequent application of analytical methods and techniques are therefore neither desired nor considered appropriate, in many instances. The smaller size of planning operations (deemed to be at a more personal level), and general despondency resulting from prior and current

lack of political and budgetary initiatives and commitments (for either human resource expansion or in-office automation) were cited as limiting factors in this regard. A respondent from RMOC perceived further expansion of their automated capabilities, but indicated that statements as to specific details in this regard would be premature since corporate planning strategies were as yet still within the formulation stages, despite the fact tenders had been advertised for consulting work (to be phased over a five year period) for the development of an integrated information system. The situation for the City of Ottawa was perceived to be similar to that of RMOC.

In general, where impending changes were anticipated as a result of upcoming development of corporate planning initiatives, most respondents, as junior/intermediate planners/analysts felt quite removed from such activities and unqualified to comment on the perceived specific direction of such activities. Overall, most respondents in general appeared either apathetic, despondent, apprehensive or defensive about data needs, computerization, and the application of scientific methods and techniques to planning operations at the local government level.

5.0 CONCLUSIONS

In conclusion, based on the results of the questionnaire and interview findings, there are gaps and differences between what is and what should be, for example, regarding the use/utility of current federal Census products and services, and the current and impending data needs, use, and research instruments for planners in the conduct of research and analysis in local government planning. The nature and extent of gaps and differences have been brought closer to light -- through discussions of

access to and use of computing facilities, data use, data needs, perceived federal census shortcomings, and, the use/utility of methods and techniques of analysis -- as discussed in sections 3.0 and 4.0.

As previously discussed, the most prevalent gaps existing are those which involve temporal considerations and desires for more timely and frequent data. Other gaps or differences between what Statistics Canada provide and local planners need involve: 1) the costs of acquiring products and services; detailed information about small areas resulting from random rounding procedures; (the lack of) land use data for urban areas; comparability with other data sources and over time with other census years, changing geographic boundaries; and, the (lack of) geographic (small area) coverage for rural communities.

The current significance and future impact of the gaps and differences -- should existing conditions continue -- are, however, difficult to ascertain. This difficulty stems from the existence of other differences more serious in consequence for overall local planning initiatives and credibility: that is, the differences between the requirements of local planning agencies to prepare for and conduct research and analysis, on the one hand, and their capability to satisfy their requirements on the other. Essentially, different agencies, depending upon their size, geographic extent and nature of planning jurisdiction (regional, urban or suburban-rural) have different demands upon the Census resulting from their varying capabilities for conducting research and analysis.

With the perceived upcoming expansion of in-office computerization and research capabilities by existing larger planning agencies -- already evident elsewhere across various Canadian municipal areas as reported in the proceedings of the Urban and Regional Information Systems Association

and the Canadian Institute of Planners (1982)* -- disparities in the abilities of planning agencies to keep abreast of the times and better understand the changing nature and conditions of the areas they are responsible for, will undoubtedly expand. Already, the needs and concerns between different local agencies (in terms of data requirements and depending upon the size of their budgets and available human and technical resources) are becoming more and more distinct, as evident from the aforementioned survey findings.

A distinction of requirements arising from the findings of the questionnaire and interviews, which considers the different needs and concerns, is as follows:

1. For the larger, primarily urban and regional (with an urban component) planning agencies, needs and concerns are reflected from the following desires as expressed by planners:

   i) for more timely, frequent, accurate and geographically detailed data (of relevance to local planning) in general;

   ii) for reduced costs in acquiring federal census products and services;

   iii) for more timely, frequent and geographically detailed income and employment (economic activity) data; and

   iv) for expanded standardization efforts for greater comparability over time, compatibility with other data sources, and for land statistics data for studies of changing land use characteristics in comparison with changing demographic trends.

* Wellar, Barry S. ed. (1982). "Prospects For Planning: Coming To Grips With New Realities", Conference Committee, Canadian Institute Of Planners.

2. For the smaller, primarily rural, suburban and regional (with rural and suburban components) planning agencies, needs and concerns are reflected from the following expressed desires:

i) for more accurate, detailed delineation and distinction in terms of geographical coverage and reporting for expanding suburban areas, small towns and rural communities;

ii) for reduced costs (as above);

iii) for greater comparability over time with other census years (in terms of geography and definitions);

iv) for more timely and frequent data in general where new development and rapid population growth, or declines in population and economic activities are apparent;

v) for the development of historical profiles and generalized "indicator" series for comparative purposes, since human and technical resources are limited; and

vi) for scaled-down software capabilities for compliance with smaller operational constraints and capabilities.

APPENDIX A.1.

FOREWARD:

QUESTIONNAIRE ON CENSUS STATISTICS FOR LOCAL AREA ANALYSIS IN URBAN & REGIONAL PLANNING
[For completion by Planning Department (Federal) census user(s)]

Attached is an extensive and fairly rigorous questionnaire on the use of federal census products and services and their related application to specific methods and techniques of planning-related analysis. Many of the questions require only a checklist of the particular type and extent of use. Many others, however, require brief comments or opinions in an effort to establish a qualitative assessment of census products and services.

The questionnaire has not been designed for the purpose of testing your knowledge, but for the purpose of compiling and analysing information to be used towards the completion of a graduate research project and masters thesis on the provision and use of census statistics for local area analysis in urban and regional planning. A thorough effort to answer all questions to the best of your abilities and on the basis of your opinions, as professionals, would therefore be greatly appreciated.

The questionnaire will be delivered beforehand for review at your discretion. Feel free to answer any or all questions as desired during this period. An interviewer will then attempt to run through the questionnaire with you -- upon proper arrangement of appointments -- in order to provide clarifications, ensure the completion of all sections and answer any of your questions concerning the questionnaire.

Thank you for your time and cooperation.

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University of Ottawa
Tel. # 231-3295

APPENDIX A.1. con't...

• TO BE COMPLETED BY PLANNING DEPARTMENT CENSUS USER(S)

1.1.0 General Introductory Information Required:

Indicate the name of your municipal or regional agency. _____

Indicate the name of your division within the planning department (if applicable).

_____

1.1.1 a) Does your planning department have access to computing facilities?

Yes ____ No ____.

b) If yes to a) above, do you use them?

Yes ____ No ____

c) If yes to b) above, indicate which of the following describes the general use.

i) data storage purposes;
ii) data processing and updates;
iii) data analysis;
iv) all of the above; _____
v) i) and ii) above only.

1.1.2 a) With respect to the acquisition of federal census products (from Statistics Canada), indicate your primary means of data acquisition from the following:

i) pre-packaged (off the shelf) data sources by standard census geographic areas;
ii) special (custom) requests;
iii) both. _____

b) If both, which are you most dependent upon? _____

c) Does your agency generally prefer:

i) tabular data by singular variables? Yes ____ No ____
ii) data which has been cross-classified? Yes ____ No ____
iii) equal preference for both? Yes ____ No ____

		NOT USED	USED	Frequency of Use: FREQUENTLY (daily/weekly/monthly)	OCCASIONALLY (semi-annual/annual)	INFREQUENTLY (2 to 5 years or more)
1.2.0	For the following general categories, Statistics Canada products and services, check (✓) whether or not your agency uses them and if so the frequency of use.					
1.2.1	Data Products: (ink-print publications)					
	a) National Series (data for Canada and the Provinces)...	____	____	____	____	____
	b) Provincial Series (seperate bulletin for each Prov.)..	____	____	____	____	____
	c) Profile Series (for specific geographic areas).....	____	____	____	____	____
1.2.2	Analytical and Reference Products					
	a) General Reference Products (ie. Census Dictionary, Summary Guides, Data Quality Publications, Census Tabulation Guide, etc.).....	____	____	____	____	____
	b) Geographic Reference Products (E.A. maps, Street Index, etc.).....	____	____	____	____	____
	c) Descriptive Series					
	c-1. Content Series (topical socio-economic trends)....	____	____	____	____	____
	c-2. Metropolitan Atlas Series (thematic maps for census metropolitan areas).....	____	____	____	____	____
1.2.3	Non-print Products					
	a) Products (tables) on microfiche.....	____	____	____	____	____
	b) Products by user summary tape.....	____	____	____	____	____
	c) CANSIM.....	____	____	____	____	____

APPENDIX A.1. con't...

		NOT USED	USED	Frequency of Use: FREQUENTLY (daily/weekly or monthly)	Frequency of Use: OCCASIONALLY (semi-annual/annual)	Frequency of Use: INFREQUENTLY (2 to 5 years or more)
1.3.0	Geographic Framework (data products by geographic area)					
1.3.1	Administrative					
	a) Provinces and Territories					
	b) Federal Electoral Districts					
	c) Census Divisions					
	d) Census Consolidated Subdivisions					
	e) Census Subdivisions					
1.3.2	Statistical					
	a) Census Metropolitan Areas/Census Agglomerations					
	b) CMA/CA Parts					
	c) Census Tracts					
	d) Provincial Census Tracts					
	e) Urban Areas					
	f) Enumeration Areas					
1.4.0	Custom Tabulations (User Request Tables)					
	a) by Standard Geographical Areas					
	b) by non-standard geographical (special request) areas					

Comments for Section 1.

_____

_____

_____

_____

_____

_____

		ACQUIRED (For dissemination to public)	Not Used	Used	General Purpose of Use: DESCRIPTION (of current situation)	General Purpose of Use: ANALYSIS (of relationships)	General Purpose of Use: PROJECTION (of trends ie. forecast)	Frequency of Use: FREQUENTLY (daily/weekly or monthly)	Frequency of Use: OCCASIONALLY (semi-annual/annual)	Frequency of Use: INFREQUENTLY (2 to 5 years or more)	Respective Methods and Techniques of Analysis.
2.0	For the following Statistics Canada census data products (variables by sub-groups), check (✓) the appropriate columns ie. the first column if variables are acquired for public access but never used; not used or used; the general purpose of use: the frequency of use, etc. Ignore the final column on methods and techniques for now; complete after section 8.0.										
2.1.0	Population Variables										
	a) population counts (in general)										
2.1.1	Demographic										
	a) age										
	b) sex										
	c) marital status										
	d) first marriage: age/date										
	e) fertility										
	f) mobility status										
	g) family status										
2.1.2	Social/Cultural										
	a) place of birth										
	b) immigration: age/date										
	c) citizenship										
	d) ethnicity										
	e) religion										

APPENDIX - A.1. con't...

	ACQUIRED (for dissemination to public)	NOT USED	USED	General Purpose of Use: DESCRIPTION (of current situation)	General Purpose of Use: ANALYSIS (of relationships)	General Purpose of Use: PROJECTION (of trends ie forecasts)	Frequency of Use: FREQUENTLY (daily/weekly or monthly)	Frequency of Use: OCCASIONALLY (semi-annual/annual)	Frequency of Use: INFREQUENTLY (2 to 5 years or more)	Respective Methods and Techniques of Analysis
2.1.3 Language										
a) mother tongue										
b) home language										
c) official language										
2.1.4 Education										
a) school attendance										
b) highest grade										
c) number of years										
d) highest degree										
2.1.5 Economic Activity										
a) labour force activity										
b) weeks worked										
c) hours worked										
2.1.6 Labour Characteristics										
a) place of work										
b) industry										
c) occupation										
d) class of worker										
2.1.7 Income										
a) total income										
b) wages and saleries										
c) self employment										
d) transfer payments										
2.2.0 Housing Variables										
a) general housing count										
2.2.1 Private Occupied Dwelling Variables										
a) structural type										
b) period of construction										
c) number of rooms/bathrooms										
d) heating equipment										
e) need of repairs										
f) value										
g) fuel used										
2.2.2 Private Household Variables										
a) tenure: owned/rented										
b) length of occupancy										
c) type of household: ie. family/non-family										
d) rent: cash/gross										
e) rent to income ratio										
f) owner's expenditures										
g) owner's expenditures to income ratio										
h) crowding index										
i) household income										
2.3.0 Census Family Variable										
a) type of family: husband-wife/lone parent										
b) number of children										
c) family income										
d) characteristics of family members										

APPENDIX A.1. con't...

Comments for Section 2.

3.0 In terms of relevance for general planning needs and purposes, what are the major shortcomings (problems and/or deficiencies) associated with federal census products and services as provided by Statistics Canada?

List in any order:

4.0 Which data variables by sub-group (eg. 2.1.1 Demographic; 2.1.2 Social/Cultural, etc.) are found to be most relevant for planning?

List by order of relevance: (if, however, all data variables are held to be of equal importance, indicate so):

5.0 Comment briefly on what changes Statistics Canada could make to improve the relevance of their products and services as inputs for planners -- in terms of the following:

5.1 What is/is not collected:

5.2 The quality of data (products) provided:

5.3 The dissemination of data products and services:

5.4 Additional services (eg. software) currently not provided:

5.5 Other:

APPENDIX A.1. con't...

6.0 The following list contains a series of previously cited census shortcomings (problems and deficiencies) raised after the 1971 census. On the basis of the 1981 census, rate the severity of the shortcomings on the basis of: (1) very serious; (2) mildly serious (ie. recognized as a problem but of limited effect for planners or agency in question); (3) not applicable.

a) length of time is too long between census takings.....
b) length of time is too long between the taking of the census and the reporting of census products.....
c) lack of comparability over time (with other census years).....
d) inappropriate boundaries (standard geography).....
e) problems for detailed information about small areas (ie. reliability of data) resulting from random rounding of data.....
f) lack of migration and mobility data for small areas.....
g) lack of comparability with other data sources.....
h) problems created from changing definitions (from different census years).....
i) problems created from changing geographic boundaries.....
j) high costs in purchasing data.....
k) lack of census data in graph or chart form.....
l) confusion over which products and services are actually available.....
m) lack of geographic (small area) coverage for rural communities.....
n) lack of knowledgable people who understand your data needs and can lead you to acquire exactly what is required.....
o) lack of more data on attitudes, preferences, etc.....
p) insufficient range of data variables.....
q) lack of information on land use within urban areas.....

7.0 Note whether any of the general statistical techniques listed below are applied by your department or unit to census statistics. For those techniques not used indicate your reasons why according to the categories provided. For those techniques that are used indicate the frequency of application.

	Not Used	Inappropriate (for general use)	Unknown	Too Complicated	Used	Frequency of Use: Frequently (daily/weekly or monthly)	Occasionally (semi-annual/annually)	Infrequently (2 to 5 years or more)
7.1.0 Univariate Analysis								
a) frequency distributions								
b) mean								
c) median								
d) mode								
e) standard deviation								
f) analysis of variation								
g) Other - please specify:								
_____								
_____								
_____								
7.2.0 Bivariate Analysis								
a) Correlation								
b) Regression								
7.3.0 Measures of Association								
a) Pearson's r								
b) Phi coefficient								
c) The percentage difference								
d) Yules Q								
e) Goodman & Kruskal's Tau/Gamma								
f) Contingency coefficient								
g) Guttman's coefficient of predictability								

APPENDIX A.1. cont...

	Not Used	Inappropriate (for general use)	Unknown	Too Complicated	Used	Frequency of Use: Frequently (daily/weekly or monthly)	Occasionally (semi-annual/annually)	Infrequently (2 to 5 years or more)
h) Spearman's rank order correlation.....								
i) Kendall's rank order correlation.....								
j) Other (for both 7.2.0 & 7.3.0) - please specify:								
_____.....								
_____.....								
_____.....								
7.4.0 Specific Statistical Tests								
a) single group mean.....								
b) single group proportion.....								
c) goodness-of-fit.....								
d) difference-of-means.....								
e) difference-of-proportions.....								
f) analysis of variance (ANOVA).....								
g) median test.....								
h) chi square.....								
i) Other - please specify:								
_____.....								
_____.....								
_____.....								
7.5.0 Multivariate Analysis								
a) multiple regression.....								
b) partial or step-wise regression.....								
c) principle components analysis.....								
d) factor analysis.....								
e) cluster analysis.....								
f) entropy maximizing techniques.....								
7.6.0 Non-Parametric Statistical Techniques								
a) the sign test.....								
b) Mann-Whitney U.....								
c) the runs test.....								
d) rank correlation.....								
e) Other (for both 7.5.0 & 7.6.0) - please specify:								
_____.....								
_____.....								
_____.....								
7.7.0 Use of Graphs & Charts for presenting statistical description: a) manually generated..								
b) computer-assisted...								

	Not Used	Inappropriate (for general use)	Unknown	Too Complicated	Used	Frequency of Use: Frequently (daily/weekly or monthly)	Occasionally (semi-annual/annually)	Infrequently (2 to 5 years or more)
8.0 The following methods and techniques are illustrative of those used in planning situations. Indicate whether they are used by your agency, and if so, the frequency of use. If not used, indicate your reasons why according to the categories provided.								
8.1.0 Projection (Forecasting) and Simulation Techniques:								
8.1.1 Population								
a) trend extrapolation.....								
b) linear models (including linear programming, exponential & S-shaped or gompertz)..								
c) ratio techniques (eg. best fit).....								

APPENDIX A.1. cont'd ...

	Not Used	Inappropriate (for general use)	Unknown	Too Complicated	Used	Frequency of Use: Frequently (daily/weekly or monthly)	Occasionally (semi-annual/annually)	Infrequently (2 to 5 years or more)
d) matrix methods (eg. cohort-survival)								
e) gaming techniques (eg. Monte Carlo)								
f) Markov Chains (eg. probabalistic)								
g) social area analysis/urban factorial ecology								
h) Other - please specify:								
_____								
_____								
_____								
8.1.2 Economic Activity								
a) location quotient								
b) economic base								
c) multiplier/linkage-type analysis								
d) input-output analysis								
e) shift-and-share analysis								
f) commodity-activity analysis								
g) econometric models (with regression)								
h) technique for area planning (TAP - ie. a modified input-output/location quotient technique)								
i) Other - please specify:								
_____								
_____								
_____								
8.1.3 Housing								
a) headship rate model								
b) household distribution model								
c) housing allocation model								
d) rent model								
e) residential density model								
f) Other - please specify:								
_____								
_____								
_____								
8.1.4 Integrated Forecasting Techniques for land use projection (ie. population and employment and/or housing)								

8.2.0 Comment on the utility of any or all of the above mentioned methods and techniques (ie. sections 8.1.1 to 8.1.4)

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APPENDIX A.1. con't...

	Not Used	Inappropriate (for general use)	Unknown	Too Complicated	Used	Frequency of Use: Frequently (daily/weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
8.3.0 Spatial Interaction/Allocation Models								
a) gravity models								
b) spatial interaction models								
c) spatial distribution models								
d) intervening opportunities model								
e) origin/destination analysis								
f) traffic assignment models								
g) trip distribution models								
h) trip generation models								
i) EMPIRIC or PLUM (econometric type land use models)								
j) Urban Development Models (dynamic programming, Lowry-Garin type deterministic models; ie. combined land use/transportation)								
k) Other - please specify:								
_____								
_____								
_____								

8.4.0 Comment on the utility of any or all of the above mentioned methods and techniques for section 8.3.0.

_____

_____

_____

_____

_____

	Not Used	Inappropriate (for general use)	Unknown	Too Complicated	Used	Frequency of Use: Frequently (daily/weekly or monthly)	Occasionally (semi-annual/ annually)	Infrequently (2 to 5 years or more)
8.5.0 Evaluation Methods and Techniques								
a) judgement								
b) ranking								
c) cost-benefit analysis								
d) cost minimization								
e) goals achievement matrix								
f) planning balance sheet								
g) PPBS/MBO								
h) robustness testing methods								
i) AIDA (associated interconnected decision areas -- a linkage type analysis employing a Strategic Choice approach)								
j) potential surface analysis								
k) development potential analysis								
l) threshold analysis								
m) critical path analysis								
n) Urban Development Models								
o) Other - please specify:								
_____								
_____								
_____								

APPENDIX A.1. con't...

13.0 a) Could your time be allocated more effectively on local area analysis and other planning matters if all relevant data could be obtained, to your specifications, from a national data clearinghouse?

Yes ____ No ____

b) Would you favour the idea of the establishment of such a national data clearinghouse?

Yes ____ No ____

c) State your reasons for either favouring or opposing such a concept?

d) If in favour of b) above, what other sources and/or data products beyond that currently provided from the federal census would you desire which might be accessed and interrelated from a national data clearinghouse ?

14.0 If data from Administrative Records (eg. income tax, unemployment insurance, family allowance, old-age pension, welfare, etc.) were to be made accessible and linked to a suitable and compatible geographic base (as opposed to the use of personal identifiers), what particular relevance to and uses for planning, in your estimation, could the data be applied? Comment:

15.0 Comment on the potential use/utility of the postal code as a geographic locator for small area statistics (derived from administrative data records as mentioned above).

APPENDIX A.1. con't...

8.6.0 Comment on the utility of any or all of the above mentioned methods and techniques for section 8.5.0.

9.0 *The following is a fairly rigorous question, however, its completion is of utmost importance for the research effort. A thorough effort on your part to complete this question would therefore be tremendously appreciated.

Return to section 2. and complete the final column by cross-referencing the methods and techniques used within your planning department as indicated through sections 7. and 8. according to the specific census data products (variables by sub-group). An example might be: for the cohort-survival matrix population projection method, indicated as 8.1.1 -d), which would be listed under 2.1.1 a) for age; and, 2.1.1 -b) for sex, etc. Any additional comments about this effort are to be summarized below.

10.0 If, as planners, you were required to conduct analysis for the preparation of annual reports, commenting, in a monitoring-like fashion, on the status for and impacts of the previously adopted land-use plan, what data products (by sub-groups) would you desire to use as 'descriptive indicators' ie. to indicate whether or not progress was being made in pursuit of the plans' stated objectives? List:

11.0 In your estimation, do Statistics Canada census products take sufficient account of local conditions which may be of significance to local area analysis in planning?

Yes ____ No ____

Comment: _____

12.0 a) With respect to data base development and application activities for planning, are you required to spend considerable time attempting to collect and compile data from a variety of different sources (ie. where it does not concern time spent for analysis of data)?

Yes ____ No ____

b) What proportion of your time (expressed as a percentage of working hours) is spent on such functions? _____

c) In your view, is this a productive way for you to be spending your time?

Yes ____ No ____

d) Comment: _____