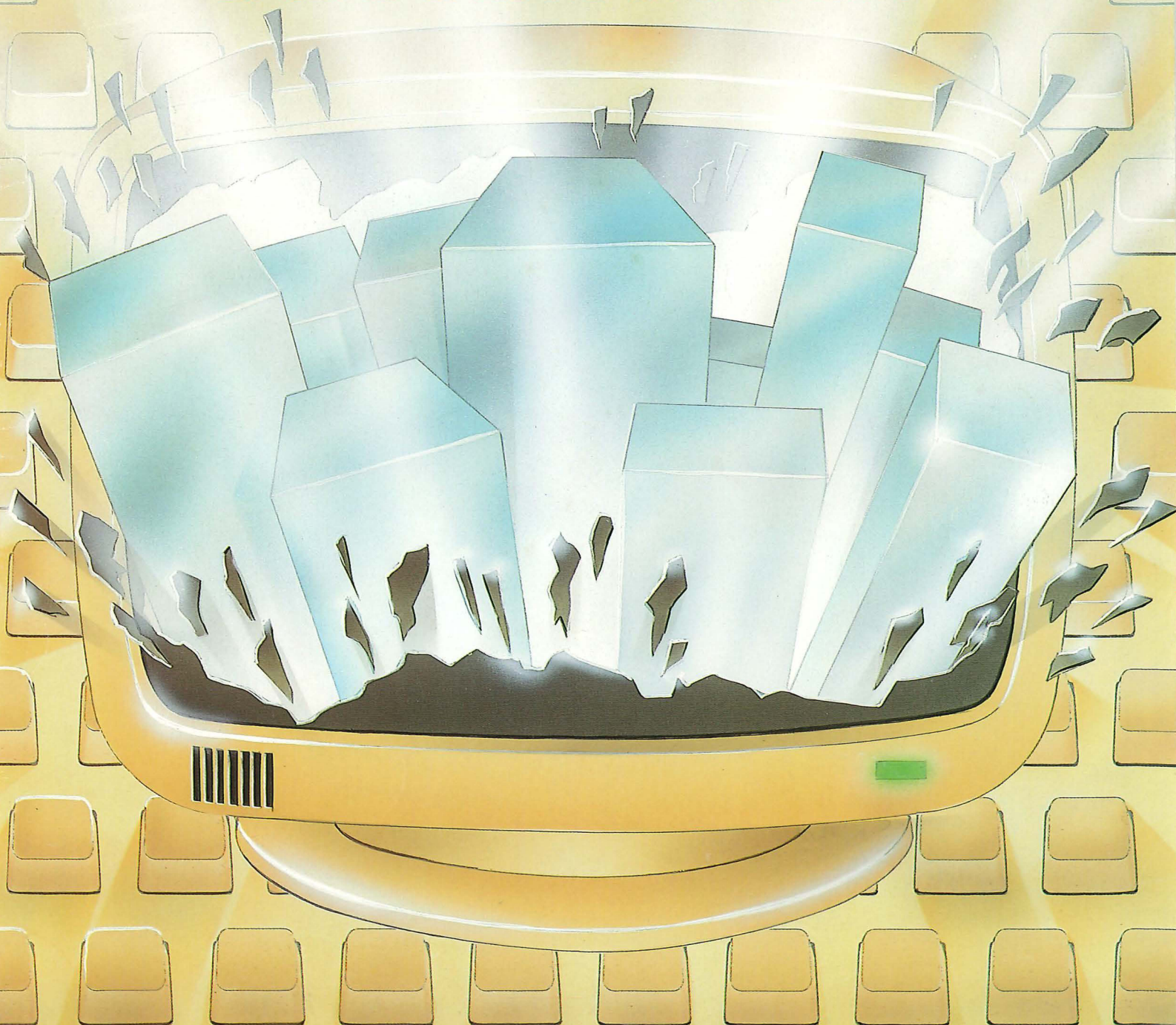


# Plan Canada

July/juillet 1993

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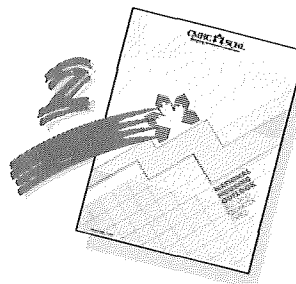


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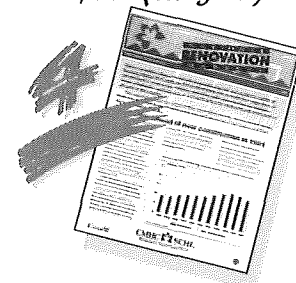


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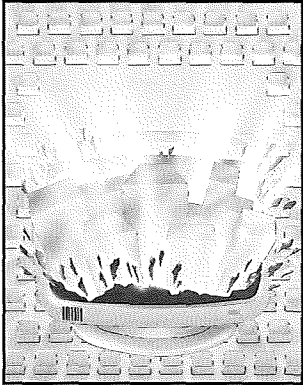
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## ENTRE NOUS

For many planners, Geographic Information Systems (GIS), Computer Assisted Design (CAD) and Management Information Systems (MIS) are now part of the daily vocabulary and practice. For others (especially those of us trained in the pre-1970 dark ages), however, I sense that these terms are still little more than concepts. Most planners now use a word-processing package and database programs, are part of an E-mail system and increasingly employ spreadsheets in decision-making. Graphic programs and desktop publishing have significantly improved the quality of planning reports.

I recently conducted a brief, highly unscientific survey, the results of which show that many planners feel they have made tremendous strides since the days of Fortran computer courses and stacks of computer cards (remember those?). In spite of these accomplishments, however, it is clear many planners are convinced that GIS is the purview of a small number of experts, that CAD should be used only by designers and that management information systems are the domain of "computer jocks." This is a dangerous position. The truth is, technological and software advances are giving considerable power to the desktop computer operator.

It is imperative that planners familiarize themselves with those aspects of GIS, CAD and MIS technology that will influence and improve planning practice. This issue of *Plan Canada* is intended to contribute to this knowledge by examining conceptual issues and examples of GIS and CAD use.

For the uninitiated, Mary Jo Van Order looks at the important planning concepts behind GIS, CAD and MIS from a layman's point of view.

Some planning departments are riding the crest of the GIS wave, emerging as leaders in the development of this technology.

Regardless of the initiator, however, it is clear that planners must determine what their information needs are and where relevant data should be located. Raphael Sussman and Brent Hall examine the issue of municipal inter-department cooperation in GIS development and discuss the planner's role within the framework of a municipal GIS.

### **"Planners must familiarize themselves with those aspects of GIS, CAD and MIS technology that will influence and improve planning practice."**

L.E. Milton examines the cooperation theme in more detail, looking at GIS development partnerships established by Ontario Hydro. This first-hand experience provides readers with a unique perspective of the problems of and the potential for information-sharing within a GIS.

Greg Radford examines GIS in the context of decision-making in watershed planning. In this article, GIS emerges not as a tool for a limited number of experts but as a concept that is incorporated into daily practice.

Pierre Maurice and co-authors examine how a Geographic Information System can be used to help smaller municipalities develop safe road networks.

Based on his experience, John Alley discusses a number of issues relating to the use of 3-D CAD images as evidence at planning hearings. Planners who have struggled through a development hearing in which visual impact is a critical factor will appreciate this information.

The tip of the GIS, CAD and MIS iceberg has been thrust into the planning arena. What lies below the surface may change the face of our profession as we know it. ♦

Pour beaucoup d'urbanistes, les systèmes d'information géographique (SIG), la conception assistée par ordinateur (CAO) et les systèmes intégrés de gestion (SIG) font maintenant partie de la pratique et du vocabulaire quotidiens. Cependant, pour d'autres (en particulier ceux d'entre nous qui avons été formés avant les années 1970), je pense que ces termes ne sont encore guère plus que des concepts. La plupart des urbanistes utilisent maintenant un logiciel de traitement de texte et des bases de données, sont abonnés au courrier électronique et utilisent de plus en plus des tableaux dans la prise de décision. Les programmes de graphisme et l'édition ont considérablement amélioré la qualité des rapports d'urbanisme.

J'ai récemment effectué un bref sondage sans aucune prétention scientifique qui indique que beaucoup d'urbanistes considèrent avoir fait des progrès énormes depuis l'époque des cours de Fortran et des piles de cartes perforées. Mais, malgré ces progrès, un grand nombre d'entre eux semblent encore croire que les SIG sont du ressort d'un petit nombre de spécialistes, que la CAO devrait être utilisée seulement par les concepteurs et que les systèmes intégrés de gestion s'adressent uniquement aux «mordus de l'informatique». Cette opinion est dangereuse. En réalité, les progrès au niveau de la technologie et des logiciels donnent un pouvoir considérable à l'utilisateur de l'ordinateur personnel.

Il est impératif que les urbanistes apprennent à connaître les aspects de ces technologies qui permettent d'améliorer la pratique urbanistique. Le présent numéro de *Plan Canada* vise à contribuer à ces connaissances en examinant les questions conceptuelles et des exemples de l'utilisation des SIG et de la CAO.

Pour les néophytes, Mary Jo Van Order examine les principaux concepts urbanistiques

propres à ces technologies en prenant le point de vue du profane.

Certains services d'urbanisme sont des chefs de file dans le développement de la technologie des SIG. Mais, peu importe l'utilisateur, il est clair que les urbanistes doivent déterminer quels sont leurs besoins en information et où se trouvent les données pertinentes. Raphael Sussman et Brent Hall examinent la question de la coopération entre les services municipaux dans le domaine du développement des SIG et mettent en lumière le rôle de l'urbaniste dans le cadre d'un SIG municipal.

L.E. Milton examine plus en détails le thème de la coopération, et notamment les partenariats pour le développement des SIG établis par Ontario Hydro. Cette expérience pratique offre aux lecteurs une perspective unique des problèmes et des possibilités de partage d'information dans le cadre d'un SIG.

Greg Radford analyse les SIG dans le contexte de la prise de décisions pour la planification des bassins hydrographiques. Dans cet article, le SIG est présenté non comme un outil limité à quelques spécialistes, mais comme un concept intégré à la pratique quotidienne.

Pierre Maurice et ses co-auteurs examinent comment les petites municipalités peuvent recourir à un système d'information géographique pour améliorer la sécurité du réseau routier.

D'après son expérience, John Alley aborde l'utilisation des images CAO tridimensionnelles comme élément de preuve dans les audiences portant sur l'urbanisme. Les urbanistes qui ont déjà témoigné lors d'audiences dans lesquelles l'élément visuel est un facteur crucial apprécieront cette information.

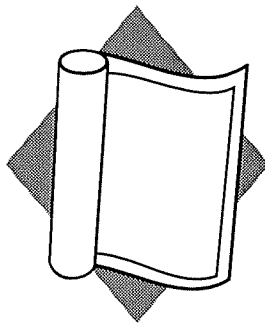
La pointe de l'iceberg de ces technologies vient de faire son entrée sur la scène de l'urbanisme. Ce qui repose sous la surface peut modifier le visage de la profession telle que nous la connaissons. ♦

Walter Jamieson, ACP, MCIP / ACP, MICU  
Co-éditeur / Corédacteur



# BLUEPRINT

A CIP COMMENTARY



# PLAN D'ACTION

UN COMMENTAIRE DE L'ICU

## A Retrospective

This issue of *Plan Canada* will arrive in your mailbox sometime in July. By then the Victoria conference and the 1993 Annual General Meeting will be history, and I will no longer be your President. Thinking about what to include in this, my final, column, I wondered how to convey the essence of a year in 1,000 words. Was there an overall message I could pass on? I decided a good starting-point would be to highlight some of the more significant events of the past 12 months.

One of the best initiatives of this Council was to engage in a more active advocacy role. Long ago CIP recognized the need to stimulate discussion of planning issues and to participate in shaping public policy, but finding volunteers willing to research an issue and draft appropriate reports on our behalf has proven to be a difficult task. In this year's budget we set aside funds to pay members up to \$1,000 for writing position papers. Council identified four priority topics: sustainable development, urban sprawl, native issues and economic/equity issues.

The initiative of a few of our members has resulted in a new *Statement of Ethical Values* and *Code of Professional Conduct*. By the time you read this, you will

have received a copy of this draft for review and comment. The *Statement of Ethical Values* sets out the basic philosophies that inspire and guide our practice. Building on those values, the *Code of Conduct* prescribes standards of conduct with respect to public and professional responsibilities. If the draft document receives a favourable response, we will amend our by-laws accordingly.



Several years ago, the International Federation for Housing and Planning (IFHP), based in The Hague, asked CIP to consider hosting an IFHP conference in Edmonton. Since then, a group of Edmonton planners has been working closely with CIP, AACIP and IFHP in this regard. After lengthy negotiations, it appears likely that next year's CIP conference will be a joint event with IFHP. Since 1994 marks the Institute's 75th anniversary, the Edmonton confer-

## Une rétrospective

Vous recevrez ce numéro de *Plan Canada* en juillet. À ce moment, le congrès de Victoria et l'assemblée annuelle de 1993 seront choses du passé et je ne serai plus votre présidente. En pensant à un sujet pour ma dernière rubrique, je me suis demandé comment résumer l'année en mille mots. Y avait-il un message global que je pouvais vous transmettre ? J'ai décidé qu'il serait opportun de passer en revue certains des événements les plus importants des douze derniers mois.

Une des meilleures initiatives du présent Conseil a été de jouer un rôle de promotion plus actif. L'ICU reconnaît depuis longtemps la nécessité de favoriser le débat sur les questions d'urbanisme et de contribuer à façonner les politiques publiques, mais il a été difficile de trouver des bénévoles disposés à étudier une question et à rédiger des rapports au nom de l'Institut. Dans le budget de cette année, nous avons prévu accorder jusqu'à 1 000 \$ aux membres pour la rédaction d'énoncés de position. Le Conseil a choisi quatre thèmes prioritaires : le développement viable, l'étalement urbain, les questions autochtones ainsi que les questions touchant l'économie et l'égalité.

Grâce à l'initiative de quelques-uns de nos membres, l'ICU a maintenant un nouvel *Énoncé des valeurs morales* et un nouveau *Code de conduite professionnelle*. Lorsque vous lirez ces lignes, vous aurez reçu les ébauches de ces documents pour fins d'examen et de commentaires. L'*Énoncé des valeurs morales* établit les principes de base qui inspirent et guident notre travail. S'appuyant sur ces valeurs, le *Code de conduite professionnelle* prescrit des normes relativement à nos responsabilités publiques et professionnelles. Si ces documents sont adoptés, nous modifierons notre règlement en conséquence.

Il y a quelques années, la Fédération internationale pour l'habitation, l'urbanisme et l'aménagement des territoires (FIHUAT), dont le siège social est situé à La Haye, avait demandé à l'ICU d'accueillir le congrès de la FIHUAT à Edmonton. Depuis ce temps, un groupe d'urbanistes d'Edmonton a travaillé étroitement avec l'ICU, l'AACIP et la FIHUAT. Après de longues négociations, il semble que l'an prochain le congrès de l'ICU sera présenté conjointement avec celui de la FIHUAT. Puisque 1994 marquera le 75<sup>e</sup> anniversaire de l'Institut, le congrès d'Edmonton permettra de mettre en lumière les réalisations de l'urbanisme au Canada depuis trois quarts de siècle. Nous serons heureux d'accueillir nos collègues du monde entier à cette occasion et nous encourageons nos membres à prévoir des fonds dans leur budget pour cet événement, lequel aura lieu en septembre 1994.

L'an dernier, le Fonds en fidéicommis de l'ICU pour les bourses d'étude a décerné sa première bourse. Au moment de rédiger ces lignes, nous étudions les candidatures pour la bourse de cette année, dont le lauréat sera annoncé au congrès de Victoria. Nous remercions les

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ence will be used to showcase three-quarters of a century of Canadian planning achievements. We look forward to having international colleagues join in our celebration and encourage members to make room in their budgets for this September 1994 event!

The CIP Student Scholarship Trust Fund awarded its first scholarship last year. As I write, applications for this year's scholarship are being reviewed, with the award to be announced at the Victoria conference. Thanks to those of you who have supported the Trust with personal donations; we also appreciate the major donation from the Outdoor Advertising Association of Canada. I look forward to the scholarship award becoming an annual event — and a tangible acknowledgement of the importance of student members to the future of the planning profession.

**“We each have the potential to serve as a leader and facilitator in helping our communities respond to change.”**



This year marks the first of what we hope will become another annual occurrence — a continuing education course offered in conjunction with the national conference. The “Re-Planning the Urban Community” workshop in Victoria is already sold out! Also on the continuing education front, look forward to a new “Bookshelf” service, which will improve your access to current planning literature.

The changes at the National Office in the last year have been significant. After seven years as Executive Director, David Sherwood resigned to re-establish his consulting practice. We wish him well on this next stage of his career. Sylvia Franke, our new Executive Director, comes to us from the Association of Universities and Colleges of Canada. In

addition to ensuring the effective administration of Institute projects and budgets, Sylvia's priorities include establishing more efficient links with affiliates on membership records and pursuing the possibility of computer conferencing for members.

And so ends my summary of some of last year's activities. I am pleased with the focus on our public presence and our services to members, both of which are consistent with the priorities set out in CIP's *Strategic Plan*. Now for my parting message, based on my perspective as your President over the past year.

**W**orking with the National Council and meeting planners from across the country has taught me a great deal. This contact has reinforced my opinion that we each have the potential to serve as a leader and facilitator in helping our communities respond to change. By assuming an advocacy role on important issues, by setting standards for the education of prospective members and by facilitating the continuing education of practising planners, the Institute will, in part, give the members of our profession the strength to fulfill this role.

In my opinion, we have concentrated too much of our energy on administering prescriptive membership standards and not enough on ensuring that those who practise planning have access to the support a professional organization should provide.

The profession and the public would be better served by welcoming all planners who can demonstrate appropriate skills in a variety of ways and in ensuring that our members have on-going exposure to new ideas and techniques. Neither the profession nor the public will benefit if we exist as an elitist organization.

Let's find ways to encourage those planners who are not members to join the Institute, and let's work together to improve the state of the art of planning. ♦

*Helen Henderson, MCIP  
President, CIP, 1992–1993*

membres qui ont fait des dons personnels ainsi que l'Association canadienne de l'affichage extérieur pour son importante contribution. J'espère que cette bourse d'étude sera décernée annuellement, puisqu'elle permet de reconnaître de façon concrète l'importance des membres étudiants pour assurer l'avenir de notre profession.

Cette année, conjointement avec le congrès national, nous présentons un atelier de perfectionnement professionnel, activité que nous espérons répéter annuellement. Cet atelier, intitulé «Réaménagement de la communauté urbaine», est déjà complet ! Nous vous offrirons également un nouveau service d'information destiné à faciliter l'accessibilité à la documentation actuelle portant sur l'urbanisme.

Au cours de la dernière année, des changements importants sont survenus au Bureau national. Après sept ans au poste de directeur général, David Sherwood a quitté ses fonctions pour reprendre sa pratique de consultation. Nous lui souhaitons beaucoup de succès dans cette nouvelle étape de sa carrière. Sylvia Franke, notre nouvelle directrice générale, travaillait auparavant pour le compte de l'Association des universités et collèges du Canada. En plus d'assurer l'administration efficace des projets et des budgets de l'Institut, M<sup>me</sup> Franke s'est fixée comme priorités l'établissement de liens plus efficaces avec les associations affiliées en ce qui concerne les dossiers des membres et la mise en place d'un système de téléconférences informatisées avec les membres.

Ainsi se termine cette rétrospective des activités de l'an dernier. Je suis satisfaite de l'intérêt que nous avons porté à la pré-

sence publique et aux services aux membres, deux éléments qui s'inscrivent dans les priorités du plan stratégique de l'ICU. Maintenant, voici mon message de départ, fondé sur ma perspective à titre de présidente au cours de la dernière année.

**J'**ai beaucoup appris en travaillant avec le Conseil national et en rencontrant des urbanistes à l'échelle du pays. Ces contacts m'encouragent à croire que nous sommes tous capables de jouer un rôle de chef de file et de catalyseur pour aider nos collectivités à réagir aux changements. En défendant les questions importantes, en établissant des normes pour la formation de membres éventuels et en facilitant le perfectionnement professionnel des urbanistes, l'Institut aidera les membres de notre profession à assumer ce rôle.

À mon avis, nous avons consacré beaucoup trop d'énergie à administrer des normes d'adhésion prescriptives et pas assez pour nous assurer que ceux et celles qui pratiquent l'urbanisme ont accès au soutien qu'un organisme professionnel devrait leur fournir.

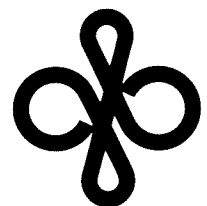
La profession et le public seraient mieux servis si nous encourageons tous les urbanistes à mettre en valeur leurs diverses aptitudes et si nous tenions nos membres continuellement informés des nouvelles idées et des nouvelles techniques. Nous n'avons rien à gagner en étant un organisme élitiste.

Cherchons donc à encourager les urbanistes qui ne sont pas membres à se joindre à l'Institut et travaillons ensemble en vue d'améliorer l'art de l'urbanisme. ♦

*Helen Henderson, MICU  
Présidente, MICU, 1992–1993*

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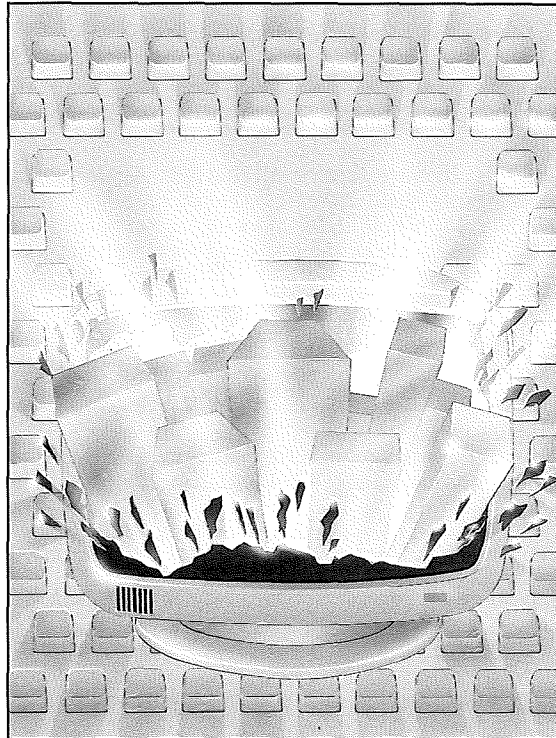




# CADD, GIS AND MIS: A BACKGROUNDER FOR PLANNERS ... MARY JO VAN ORDER

## RÉSUMÉ

AUJOURD'HUI, ON NOTE D'ÉNORMES PROGRÈS EN MATIÈRE D'ÉLABORATION ET D'APPLICATION DES SYSTÈMES D'INFORMATION INFORMATISÉS. EN SE FONDANT SUR LA DOCUMENTATION RÉCENTE, L'AUTEURE EXAMINE TROIS DE CES SYSTÈMES ET SOULIGNE BRIÈVEMENT L'UTILITÉ DE CHACUN POUR LES URBANISTES. ELLE COMPARE, DANS LA PERSPECTIVE D'UN PROFANE, LES STRUCTURES DE DONNÉES, LA MANIPULATION DE CES DONNÉES, LES OUTILS ANALYTIQUES ET L'INCIDENCE DE CES SYSTÈMES SUR LES ORGANISMES.



During the past five years, the computer industry has matured, especially in the area of graphics. This type of application requires special features, such as high-resolution, colour and special input/output (I/O) devices (a mouse and tablet, for example). Professional-level graphics software includes design packages such as CADD, which require precision tools in the form of plotters, scanners and digitizers.<sup>21</sup>

Computer-aided design and drafting (CADD or CAD) is the application of computer technology to the design of a product, or the design itself. Its use involves interaction with drawing and view manipulation programs displayed on a computer screen and the running of analytical programs that check the sketched design. The origins of CADD lie in these analytical programs (such as, finite element structural analysis), but as CADD evolved, the emphasis

Information systems are tools used to convert large volumes of data into timely, meaningful information. When the primary purpose is to supply information to management, the system is commonly called a Management Information System (MIS).

The MIS was one of the first applications of information systems in the 1960s.<sup>2</sup> Although there is some disagreement and confusion about the exact nature of MIS, essentially this type of system exists to support the problem-solving or decision-making needs of managers. Today — partly as a result of reluctance to change from established, costly systems — the tendency is to use an MIS for operational processes.

The three main functions of an MIS are problem detection, problem analysis and decision-making.<sup>19</sup> However, decision-making is more often implemented in a different class of systems: Decision Support Systems (DSS) or Expert Systems (ES). One of the more important characteristics of an MIS is that it usually includes a large and complex database,<sup>6</sup> which supports the problem detection and analysis functions.

shifted first to drafting and more recently to the modelling of three-dimensional objects.

Today's CADD drawing process creates more than just a drawing; it creates a database in which different viewing angles are provided.<sup>13</sup> To draw with CADD means to enter a series of commands that cause a database to be generated, and the database can be displayed as an image on the monitor.

The basic premise of a Geographical Information System (GIS) is geographically located data that can be interrogated and analyzed, and the relevant data needed for decision-making and planning extracted. The most important characteristics of a GIS are its ability to map information and refer to features that can be located; identify relationships among mapped features; and process their geometric characteristics for analyzing data in a spatial context.<sup>14</sup> Usually this is accomplished by storing graphical or map information in a database produced from many sources (for example, tax maps, engineering maps, census maps, remote sensing); and by storing non-graphical, descriptive data ('attributes') linked by location (for example, parcel number, address, intersection, block number, census tract number) and geographical co-ordinates in either the same or a separate database.<sup>19</sup>

Some experts prefer to use a broader term, such as "geographic information management technology," when referring to the many systems available for mapping and processing spatial information and to use the term GIS

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# OVERVIEW ❖ SURVOL

TABLE 1

<p><b>MAIN PURPOSE</b>  MIS: Operations modelling  CAD: Object modelling  GIS: Earth's surface modelling (cartography)</p>
<p><b>DATA MODEL &amp; STRUCTURE</b>  MIS: Network, hierarchical or relational. Mostly fixed field numeric, some text  CAD: Mainly relational. Solid representation by aggregation of pieces; boundary representation by line segments; abstract representation by relationship semantics (NEAR, ABOVE, NEXT TO, BEHIND)<sup>1</sup>  GIS: Sector-based systems are similar to CADD. Raster-based systems vary. Greater capacity for attribute than CADD</p>
<p><b>GRAPHICS &amp; DATA MANIPULATION</b>  MIS: Database query &amp; extraction; reports. Graphics are peripheral: charts, presentation graphics  CAD: Database query &amp; extraction; reports. Precise scale drawing based on specified measurements &amp;/or modelling. Manipulation of drawn object (e.g., ROTATE, SCALE, COPY, MOVE, FILL IN). Mostly 'vector'(pixel)-based  GIS: Database query &amp; extraction; reports. Precise scale drawings based on geometric coordinates &amp; relationships. Mostly 'vector'-based, but also 'raster'(grid)-based</p>
<p><b>ANALYTICAL TOOLS</b>  MIS: Spreadsheets, summary, statistical. Supplemented by DSSs, ESs &amp; Executive ISs  CAD: Finite element analysis, estimating materials, other engineering &amp; design analysis. May use co-ordinate geometry<sup>15</sup>  GIS: Spatial &amp; topological analysis (raster-based supports area comparisons; vector-based supports precise locating)</p>
<p><b>INFORMATION CAPTURE</b>  MIS: By operational personnel, usually in addition to regular tasks. Source of data is everyday transactions<sup>19</sup>  CAD: Usually by trained, dedicated technicians using precision tools. Source of data is pre-existing drawings or from (sketch) specifications  GIS: Similar to CADD, except source of data is new or pre-existing map or attribute data</p>
<p><b>ORGANIZATIONAL IMPACT</b>  MIS: In theory, could integrate &amp; unify an organization, but in reality, effectiveness is limited because use tends to focus at only the tactical level  CAD: Application-dependent. Impact ranges from productivity benefits in one department or across the organization, to an impact similar to the theoretical impact of GIS &amp; MIS  GIS: Theory/reality similar to MIS. Easier to implement in a single department; otherwise tends to lead to in-depth review of organization's structure, activities &amp; information needs.<sup>1</sup> Requires 'holistic'<sup>16</sup> or 'corporate'<sup>9</sup> thinking to model complex earth's surface or treat info as a corporate resource. Can improve communications,<sup>5,8</sup> pull organization together,<sup>3</sup> improve accuracy &amp; veracity of data,<sup>9</sup> &amp; spark innovation;<sup>17</sup> but can be threatening,<sup>19</sup> raise complex legal questions over data ownership, security, etc.,<sup>17</sup> &amp; raise difficult institutional questions, such as who pays, who updates.<sup>1</sup> Expectations may be unrealistic;<sup>1</sup> power shifts in the decision-making process may occur;<sup>16</sup> &amp; staffing &amp; staff training can be difficult to maintain<sup>1</sup></p>

when referring to systems that manage maps and geographic data. The other systems include computer-aided mapping (CAM); CADD or CAD; facilities mapping (FM); automated mapping (AM); geoprocessing and network analysis systems; land information systems (LIS) or land records systems (LRS); and "multi-purpose cadastre."<sup>1</sup>

Even though each of these systems evolved for different purposes, all of them use information stored in a database to support decision-making and planning through the use of data manipulation and analytical tools. How they differ is in the data structure used, the graphics and data manipulation they support, the analytical tools they provide and the way they 'fit' into an organization.

The planning uses of each type of system are summarized in Table 1, with references made to relevant literature. Perhaps for planners the most important uses of any computerized information system are as follows: to manage complex and diverse data; to facilitate analysis of alternatives; to facilitate sharing of information; and to facilitate communication of designs and their impacts, or of alternatives and their impacts (for example, modelling).

All of these uses assist the planner in making decisions in today's complex planning environment. ❖

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Table 1 (cont'd)

**USEFULNESS TO PLANNERS**

MIS: Project management; demographic, economic & financial analysis; monitoring; testing alternatives based on a numeric data model

CAD: *Project design & problem-solving*: time saver & productivity tool; presentation graphics; 3-D examination from various viewpoints; topographic modelling. *Project evaluation*: massing tests (heights, volumes) & visual experience tests for urban design; performance analysis; tolerance tests;<sup>15</sup> dimension tests. *Explore ideas*: 'what if' analysis; edit & interact with drawings; participatory design; negotiation tool.<sup>3,4,20</sup> *Serve as front end to GIS*: a more user-friendly drawing tool for working with the more sophisticated, less friendly GIS; (17% of ARC/INFO (GIS) users also use AutoCAD (CADD)).<sup>15</sup> *Serve as a simple GIS*: especially as CADD systems become more sophisticated

GIS: Minimally, a set of GIS tools linked to an integrated database of the basic socio-economic & land use info enables planners to conduct exploratory spatial analysis. Optimally, GIS offers the possibility of supporting a sophisticated DSS.<sup>17</sup>

In general, it can improve efficiency and effectiveness in working with map info & associated data;<sup>14</sup> provide map indexes to data; & generate more choices for decision-making. It is a tool that can pull together urban & environmental planning through its layering abilities & facilitate impact assessment of various kinds.<sup>8,15</sup> It provides a defensible methodology for arriving at mutually satisfactory final solution between various stakeholders over urban and/or resource development.<sup>3,4,20</sup>

An application-oriented viewpoint suggests that three levels of detail & representation of features are often employed in an urban planning context:<sup>17</sup> *Generalized level*, 1:100,000. Based on zones for aggregating individual transactions or occurrences; confined to statistical analysis & mapping of socio-economic data. *Intermediate level*, 1:10,000. Supports locational analysis, map layering, statistical analysis, network analysis & analysis of specific occurrences (e.g., housing starts, criminal activity). (This is the scale used in the 1990 U.S. Census.) *Finest level*, 1:1,000. Detailed maps for facility management, maintenance of ownership info & engineering design. This is the most costly level, hence it is usually maintained by a utility or other dedicated body (e.g., tax assessment office).

**CRITIQUE**

MIS: Questionable approach due to restricted usefulness across organization. Other systems challenging it: DSS, ES, EIS, OIS. Data capture may be a problem.<sup>14</sup>

CAD: Treats map as an individual product or file rather than as a continuous geographical database.<sup>14</sup> Drawing file size becomes a major consideration when working with large, complex maps.<sup>15</sup> Free-moving sketching not supported as well as drafting is.<sup>13</sup> May be constrained by the scale(s) it can handle.<sup>15</sup> Focus can be on mathematical or geometric operations.<sup>14</sup>

BOTH CADD & GIS: Conventional data models so far are not very successful

**FUTURE**

MIS: Capabilities absorbed by corporate-wide information system, & enhanced by DSS & Executive Info Systems (EISs)

BOTH CADD & GIS: *Technical*: Seamless interaction between CADD & GIS; parallel processing & parallel database searching to improve performance; LCD screens; object-oriented data structures; improved data verification & spatial analysis; PC/workstation convergence; interactive 3-D design with spreadsheets, realtime animation, improved integration & communication of data between organizations working on same geographical area; special presentation stations replacing plotters.<sup>7,8-12,15,22</sup> *Non-technical*: Design/build database can be carried over into maintenance database. Greater focus on producing algorithms for selecting best alternatives (DSS, ES work) otherwise may follow same pattern as MIS. Organizations may sell their information through services that will support international development potential assessment. Support public enquiry from home computers?

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# MUNICIPAL PLANNING AND GIS

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## RÉSUMÉ

AUJOURD'HUI, AU LIEU D'OBTENIR DES DONNÉES DE SOURCES EXTÉRIEURES, LES URBANISTES PEUVENT UTILISER UN SYSTÈME D'INFORMATION GÉOGRAPHIQUE (SIG) ET TIRER PROFIT DU MATÉRIEL DISPONIBLE DANS LES SERVICES MUNICIPAUX. CETTE APPROCHE REPOSE DAVANTAGE SUR LA COOPÉRATION ENTRE CEUX QUI PEUVENT PARTAGER LEURS CONNAISSANCES, LEURS COMPÉTENCES ET LEURS DONNÉES QUE SUR L'EXPERTISE EN GÉOGRAPHIE OU EN SYSTÈMES D'INFORMATION. L'EFFICACITÉ D'UN SIG EXIGE UNE COOPÉRATION AU NIVEAU DES TECHNIQUES DE MODÉLISATION DES DONNÉES, LA MISE SUR PIED D'ATELIERS POUR LES UTILISATEURS ET D'AUTRES TYPES DE PARTICIPATION. LE PROCESSUS DE MISE AU POINT D'UN SIG PERMET D'ÉTABLIR LE CONTACT PERSONNEL ENTRE LES PARTICIPANTS QUI EST CRUCIAL AU SUCCÈS DE CETTE TECHNOLOGIE. LE SIG SE PRÊTE À UNE FOULE D'APPLICATIONS EN URBANISME, TELS L'ÉLABORATION DES POLITIQUES D'URBANISME, LE DESIGN URBAIN, LE CONTRÔLE DES PLANS D'AMÉNAGEMENT ET LA PRÉPARATION DES DOCUMENTS DE PRÉSENTATION. EXCELLENT OUTIL DE CARTOGRAPHIE ET DE MODÉLISATION, LE SIG — EN PARTICULIER LE SIG MUNICIPAL — N'EST PAS EFFICACE SIMPLEMENT PARCE QUE LES DONNÉES SONT EXACTES, CLAIRES OU ACCESSIBLES, MAIS PARCE QU'IL EXISTE UNE VOLONTÉ DE COOPÉRER ET DE PARTAGER L'INFORMATION AU SEIN DE LA MUNICIPALITÉ.

The role of the municipal planner is as varied as the culture and characteristics of a town or city. Generally, however, planners in Canada are mandated with administering their provincial *Planning Act*. This commonly involves some form of long-range planning, such as the preparation of official plans or policies, the review of proposals for various types of development or amendments to the official plan. In addition, planners are often called upon to undertake specific studies on issues such as vacant and developable land, infilling to higher residential densities, the impact of proposed shopping centres and so on. Many of the activities of the municipal planner are supported by computer tools such as a Geographic Information System (GIS). Early reports from the Sewell Commission make several references to computers generally and to GIS in particular in the context of municipal planning (*New Planning News*, 1992).

This paper considers the relationship between municipal planning and planners and GIS. First, the differences between municipal and other GISs are considered. The

paper then reviews some of the functions and data that municipal planners should expect from a GIS and suggests the roles that planners and planning departments should play in the development of a GIS in their municipalities.

## A MUNICIPAL GIS

Geographic Information Systems are computer systems specifically designed to store, selectively retrieve and analyze geographically referenced data. Every GIS includes the use of digital maps for the representation and query of spatial data.

Since the development of what is now widely recognized as the world's first operating GIS in the 1960s (Coppock and Rhind, 1991), the use of GIS technology has broadened from the original focus on inventory to include a number of additional uses. For example, GISs are now used for the storage, retrieval and analysis of census data in many developed countries (Rhind, 1991). They are also used for a multitude of applications in short-term and long-range planning and resource management, as well as the many municipal functions that are central to the daily work of municipal planners.

A municipal GIS is distinguished from a GIS in general by a number of characteristics. First is the issue of scale. Local municipalities are often concerned with objects that are visible from the city sidewalk, such as individual buildings, open spaces, households and businesses. The actual configuration, such as the size, orientation, context and often shape, of each object is stored by a municipal department responsible for the object's management. Usually this information is stored in the form of paper plans or maps. A GIS allows such information to be stored digitally within a single computer system. Hence, the challenge facing a municipal GIS is largely a challenge of building functional linkages between municipal departments in order to reduce information redundancy and promote data sharing.

Individual features of interest in a municipality are often represented on maps as simplified objects at small or medium scale. For example, at a regional scale of 1:50,000, a detached building might appear as a single-point symbol along a street that is, itself, represented in simplified form as a single line. Database attributes associated with such a point symbol might be the function of the building, the date of construction, concordance with the building code and dates of building inspection by the local fire department. Within the municipality there are employees responsible for the design, construction, installation and maintenance of each of these objects as part of the larger municipal context in which they work. Urban designers often examine large-scale plans, say 1:500, showing the combination of buildings and other objects as part of the streetscape design. Public works and other city staff require close-up details, such as the location of the property line that separates the road allowance from adjacent properties.

Other characteristics that distinguish a municipal GIS from more generic GISs include the wide diversity of municipal



subject matter that must be incorporated into a single system, the diversity of data types, scales and levels of locational accuracy that must be assembled in order to accommodate many different applications, access of users from a large number of municipal departments and, possibly, external agencies that share the database, and the use of the GIS as a tool to manage municipal assets and to perform database queries (Smyrniew and Sommerville, 1988).

### APPLICATIONS USED BY MUNICIPAL PLANNERS

Some planners suggest that merely using computers in planning lends credibility to their work (Amos, 1992a). However, a GIS should not be introduced into a municipality in order to promote credibility. Rather, the intention should be more functional than cosmetic. The specific activities that individual municipal planning departments may wish to support with a GIS are: research with which to create planning policies or guidelines; review and management of development applications; review of proposals for urban design or site plan control; and presentation preparation.

A GIS supports these and other planning activities in a number of ways. Levine and Landis (1989) suggest three categories: forward data mapping, backward data mapping and interactive data modelling. Although these labels are not commonly used by GIS practitioners, the concepts they represent are common.

Forward data mapping is the display of query results essentially based on non-geographic attributes. An example might be, "Show me all the industrial buildings with vacant units in District 10." Common for market-oriented analyses or asset maintenance (Beaumont, 1991), these queries are entirely dependent on available data that have been coded to geographic identifiers.

Backward data mapping is the display of query results based, at least partially, on geographic criteria. An example of this might be, "Show me all the parcels adjacent to Parcel No. 32756." It is common to report the results of such a query as either a map or a list of identifiers. Typical feature identifiers within the municipal setting would be assessment roll numbers, but various municipal functions may use other identifiers, such as property identification numbers, building identification numbers or polygon identifiers. In the case of public notification, the information desired would likely be the non-geographic data associated with the identifiers, such as the names of owners, realty tenants, business occupants or the taxpaying mortgage holder and their respective addresses. The objects of interest could be anything in the database — whether normally visible (such as trees, manholes or sidewalks), non-visible (such as sewers) or interpreted (such as parcels of land or proposed buildings) (Sussman and Bannon, 1991).

Interactive data modelling involves simulation or prediction rather than retrieval of stored data. The most common questions asked of the system are "what if?" or "how many if?". For example: "If Main Street is made one way, what are the implications for diverted traffic flows on adjacent streets?" or "How many additional residences can be reached in three minutes if the new fire hall is located at the corner of King and Main Streets?" Often, these types of questions involve projection to a future scenario based on the history of a particular feature or location (Langran, 1992).

In addition to scenario-based modelling, a GIS can provide support for the examination of subdivision development approval, processing rezoning applications or approving amendments to the official plan and numerous other planning activities. In the context of subdivision application processing, the GIS can be used to retrieve local or regional restrictions and guidelines or policies that apply to the geographic area under consideration (Corey, 1992). The type of actions being proposed can be assessed with the GIS, thus enabling a planner to tell at a glance whether or not the application conforms to all requirements. Since applications for subdivision development or rezoning have to be circulated among several different municipal departments and also, perhaps, external non-municipal agencies, portability of documentation is very important. A GIS allows maps and associated documents to be circulated electronically between municipal departments and external agencies for viewing, redlining and commenting before development approval is finally granted or refused.

*"When used in conjunction with computer-assisted design software, a GIS can provide two- and three-dimensional computer-generated views of proposed developments, allowing urban design and site plan control concerns to be assessed."*

When used in conjunction with computer-assisted design (CAD) software, a GIS can provide two- and three-dimensional computer-generated views of proposed developments, allowing urban design and site plan control concerns to be assessed. For example, the City of Ottawa, in conjunction with the University of Toronto's Landscape Research Institute, has developed a computer program that tests the acceptability, viewed from a number of locations, of proposed developments on the skyline of the Houses of Parliament and adjacent buildings (Danahy, 1988). With an enhanced GIS, it is also possible to perform environmental assessments, such as the calculation of shadow-casting, wind movement, noise profiles and viewsheds.

Finally, a GIS supports the preparation of clearly understandable graphic and other presentation material required for public meetings and open houses. Although sometimes logistically difficult, it is nonetheless possible to bring a computer into a meeting to perform interactive "what if" scenarios based on suggestions made by councillors, committees of elected officials and the public (Amos, 1992a).

### A CORPORATE OR DEPARTMENTAL GIS?

Municipal planning departments in Canada and elsewhere have typically developed their GIS databases either by purchasing data from agencies of the federal government, by using data assembled by an immediately higher level of government, such as a provincial ministry or regional municipality, or by creating the data themselves



(Dias, 1987). However, access to data within the municipal organization is sometimes hampered by computer hardware incompatibilities and/or poor interdepartmental communication. In some cases, less than perfect co-ordination among the various departments within the same agency can make external data difficult to use (Domagala, 1987).

In contrast to the generalized detail and often dated nature of databases maintained by higher levels of government, a municipality's own departments are in constant contact with immediate and detailed changes in various aspects of their jurisdiction. For example, local changes in population (taxation base, enumeration), transportation networks (roads, transit authority), structures (building permit applications, fire department inspections) and other physical 'hard services' (sewers) and social 'soft services' (public health clinics) are recorded more or less as they occur. These data are often the most current available, more timely than data sets purchased from or based on federal or provincial agencies, and they usually relate to discrete objects rather than the generalizations or aggregations common in publicly available data sets. Thus, discrete data can be used more flexibly than pre-aggregated data from external sources.

Municipal data are often collected specifically to respond to local problems of mutual concern to planners and other city staff. By including comments from professionals, the collecting body can add value to data collected or generated by various municipal departments. Moreover, and perhaps most significantly, since the data are already stored "in-house," they do not have to be purchased from an external source.

The use of common data by municipal departments results in examination of these data by a multitude of users within the municipal organization. When computer access is properly designed, planners should be able to suggest or make corrections, as well as validate or update the data used in their projects and queries. The larger the user group, the greater the opportunity to reduce the number of errors and discrepancies (Campbell, 1989). Also, the more frequently data are used, the greater the opportunity to keep them current. The more accurate, complete and current the data, the higher the level of confidence they inspire and the more likely they are to be used. This cycle is recursive: the higher the level of use, the higher the level of accuracy, completeness and currency.

Through common access to data, the activities of the municipal planning department — and the projects in which it is involved — will result in changes to all departments and branches responsible for physical maintenance of infrastructure and the delivery of public services. The planning approval process involves many of the internal support departments of the municipality (for example, the law department, municipal clerk's department, finance department), as well as elected officials and external agencies. To meet future needs rather than merely react to existing needs, other departments must be aware of what the planning department is considering (Cowan and Shirley, 1991).

### IS FULL DATA SHARING POSSIBLE?

One of the basic responsibilities of a municipality is to provide services to its residents in a fair and equitable

manner. This can only be accomplished if the various departments in the municipal organization fully co-operate and support one another. In this context, it is important to understand that the *ability* to share current, accurate and sophisticated data is different from the *willingness* to share those data (Campbell, 1991).

As long as there are no electronic linkages between municipal departments to facilitate data sharing, interdepartmental communications will be treated as informal or voluntary. However, although they are not always formally recognized, well-established networks exist within the organizational structure of every municipality: between and within departments, and between individuals within the same department or in different departments. As well, linkages typically exist between municipal employees and professional counterparts who work externally to the municipal organization. Still other points of contact exist between the municipality and external agencies, such as local utility companies and regional and provincial government departments. However, the extent and connectedness of these webs of contact are rarely formally identified.

*"It is important that planning department staff are encouraged to learn about GIS concepts and applications and the quality and types of data required to implement an agency-wide system."*



An important reason for the absence of fully specified municipal data flow networks is that often many municipal employees resist having their data made accessible to others in isolation from their professional comments. As an example, consider the scenario where an application to a municipal planning department to rezone an area to higher density is refused on the grounds that the existing sewer system is unable to cope with increased capacity. The planning staff were able to ascertain this by inspecting the works department's sewer database for the area in question. However, the public works department engineer may have, in fact, been prepared to grant approval if consulted directly on the grounds that new development would provide financial justification for an upgrade of the sewer system in the area. Such linkages can, however, be formalized within the context of the data flow linkages and approvals process such that all departmental viewpoints are fully considered in the approval or refusal of development applications. Many commentators see such linkages as a tangible benefit of a GIS within the municipal agency (Smith and Tomlinson, 1992), whereby interaction and direct contact results in realistic and intelligent action on the part of the overall organization.

It is clear that municipal employees collect and maintain data from many sources for their own unique data sets. Prior to implementation of its GIS program, the City of



Scarborough's *Existing Data Set Study* revealed that each data set required contact with a number of agencies and that 19 percent of these data sets required regular contact with more than 25 sources within and outside the city. The consultants involved in formulating the *Information Resource Plans for the City of Scarborough* found significantly higher opportunity for data sharing in this municipality than in most private organizations (Sussman, 1990).

From a systems point of view, much of this contact and the assembly and maintenance of data is redundant, inefficient, inconsistent and less than uniformly current or accurate (Brackett, 1987; Huxhold, 1991). From the perspective of the data set owner, some of the data collection and data set maintenance efforts could be automated, shared or performed by others. However, these data sets are considered to form part of the basis for professional recommendations. Data in each private data set are analyzed at the point of collection, at the point of integration with other data and at the point of update. The entire set is never duplicated by others.

### THE PLANNING DEPARTMENT'S ROLE IN MUNICIPAL GIS DEVELOPMENT

The uses of a GIS will vary considerably between municipal departments. In general, planning departments provide advice and recommendations to other departments and the public as a matter of course. They do not, however, operate municipalities. This is the responsibility of other departments that oversee capital construction and facility maintenance. Although planning departments do require data about the city's infrastructure, they tend to use a GIS primarily to deal with issues concerning the development and use of both private and publicly-owned land. Thus, the research methods and data needed to support a GIS in a planning department are not always appropriate for infrastructure management.

All municipal departments practise some form of physical planning. The data and methods needed to support the planning functions of boards of education, boards of health, parks and recreation or public works are often expected to generate data suitable, and necessary, for their long-term facilities management. Examples of this type of planning include the scheduling of new schools, clinics, arenas or roads. Although planning departments have an interest in proposed facilities and infrastructure, they can neither generate nor maintain these data. Further, the interest of planning departments in such matters would be limited to only a few aspects of the proposed facilities, while line departments use these proposals to generate budgets and operating requirements.

Some planning departments can use external databases for some functions (such as census or provincial assessment data), even though the data may be dated, generalized or aggregated. On the other hand, other municipal departments may require exact, current statistics directly associated with individual building units. Agencies responsible for emergency response, such as fire, police or ambulance, for example, must have access to data sufficiently current to know about sites still under construction. Health, building, fire and property standards inspectors submit reports about individual sites, which could be used to update the city's records on a daily basis.

Property mapping accompanied by an associated list of attributes and buildings data can meet many municipal planning queries and data requirements (Parr, 1992). Other municipal activities require the integration of topographic data with these property, or cadastral, data. For example, park designers, civil engineers and architects require the data to perform cut-and-fill calculations, design horizontal and vertical curves or view buildings in a three-dimensional context. Some planning functions, particularly those related to visualization (urban design), may also require access to these types of data.

It is not clear, either from professional planning experience or from the literature (see, for example, Innes and Simpson, 1993), which department within a municipality is best suited to act as the leader in the development of a municipal GIS. However, since a GIS is still an idea rather than a reality in most municipalities, it is important that planning department staff are encouraged to learn about GIS concepts and applications and the quality and types of data required to implement an agency-wide system. Moreover, planning department staff should participate in internal and corporate information resource studies, data modelling sessions and joint application development (JAD) workshops.

*"In the near future, planners will find GISs associated with an increasing number of their daily activities as municipal departments, external agencies and consultants expand their use of this technology."*



The planning department should make available the skills and experiences, such as facilitation, presentation and design, of its staff during all phases of GIS introduction. The daily work interactions and multi-faceted interests of planners make them knowledgeable of the key staff members in most municipal departments and the aspects of change most likely to be of significance to each person. Planners are also commonly called upon to act as facilitators or mediators for public agencies, special interest groups and local concerns. These same skills are also very much needed to deal with the disparate groups involved with a GIS project. Similarly, as part of their task of reviewing proposals, planners routinely consider suggestions in their larger context. This ability to take a broad perspective is absolutely essential in a broadly-based municipal-wide GIS project. Some planners are also deft at verbal and written presentation, skills that are invaluable in the communication of ideas developed during implementation of a municipal GIS.

**I**n the near future, planners will find GISs associated with an increasing number of their daily activities as municipal departments, external agencies and consultants expand their use of this technology. Within the municipal framework, planners must determine what informa-

tion is relevant and important to their departments and use a GIS in support of acquiring or augmenting these data. It is critical that planners focus both on their data requirements and on GIS functionality. It is important to remember that functionality or "user-friendliness" can always be developed, acquired or improved to meet the needs of an individual, but data cannot be manufactured at will. Hence, planners should ascertain what their data requirements are, identify where these data can be located within or beyond the corporation and establish access to them. Planning departments in Canada should encourage the establishment of a corporate GIS within their municipalities and participate actively in its development. ♦

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# PARTNERSHIPS AND PROBLEMS IN DEVELOPING AND USING A GIS ... L.E. MILTON, MCIP, OPPI

## RÉSUMÉ

LA TECHNOLOGIE DES SYSTÈMES D'INFORMATION GÉOGRAPHIQUE (SIG) AMÉLIORE CONSIDÉRABLEMENT LA PERTINENCE ET LA PORTÉE DE LA PRISE DE DÉCISION DANS UN CADRE INTERDISCIPLINAIRE COMPLEXE. LES SIG SE PRÊTENT PARTICULIÈREMENT BIEN À DES COMBINAISONS DE DONNÉES ET À L'INTÉGRATION DE L'INFORMATION PROVENANT DE DIVERSES SOURCES, URBANISTIQUES ET AUTRES. LE PARTAGE DES DONNÉES EST À LA FOIS UNE SOURCE D'AVANTAGES ET DE RISQUES, PUISQUE CETTE INFORMATION COMPORTE DIVERS DEGRÉS D'EXACTITUDE, DE FIABILITÉ ET DE PRÉCISION, ET QU'ELLE PEUT SOUVENT ÊTRE MAL COMPRISE OU INTERPRÉTÉE. DANS CET ARTICLE, L'AUTEUR PRÉSENTE ET ANALYSE LES POSSIBILITÉS DE PARTENARIAT, LA FIABILITÉ TECHNIQUE ET LES RISQUES JURIDIQUES, EN SE FONDANT SUR PRÈS DE 20 ANS D'EXPÉRIENCE À ONTARIO HYDRO.

The use of a Geographic Information System (GIS) has expanded greatly in the past 10 years and — like word processing and facsimile transmission — is rapidly becoming a way of doing business for planners. From both an informational and financial perspective, GIS applications are most beneficial when they can draw together and integrate information from a variety of sources, either within larger organizations or between smaller ones. Even the burden of data acquisition and applications development — the main costs associated with this technology — can be shared.

Seeking out and sharing available digital data and finding partners with whom to share ideas and the costs of applications development are attractive ways to take advantage of existing information and reduce expenses. And the co-operative cycle implicit in these partnerships can lead to the development of more efficient ways to generate information and make decisions within organizations, or even to restructure organizations.

At Ontario Hydro, a GIS has been in use since the early '70s. From a single application initially, its use has spread to many functions, and in a recent study at least 23 opportunities for GIS applications were identified. Since Ontario Hydro generates a great deal of topographic and environmental information internally and has a number of independent GIS

users, it serves as a useful example of distributed systems learning to work together in partnerships.

## EXAMPLES OF DATA SHARING

Some of the applications in which data have been successfully shared internally or externally by Ontario Hydro are highlighted here.

### *Comprehensive Databases*

To carry out siting/environmental assessment studies, Ontario Hydro must assemble a comprehensive land use and ecological map base comprising as many as 60 layers. This application, which is also useful in municipal land use planning, has already been made available externally — at incremental cost or in exchange for other data. Other agencies can also use this comprehensive database for siting studies, and portions have been sold to their consultants.

### *Specific Themes*

GIS is an excellent technology for converting primary maps into other data types, such as "suitability for development" and "habitat" maps. Ontario Hydro has generally provided hard copy rather than digital output. However, the demand for digital products is growing as consultants and municipalities buy into the GIS technology.

Ontario Hydro is not always the sole supplier in these partnerships. It has purchased data from environmental interest groups. For example, the *Atlas of Breeding Birds* enabled Ontario Hydro to test its predictive models of bird habitats. A number of non-profit organizations that have a strong functional interest (rare plants for one example) have entered the GIS partnership business. Recently, some aboriginal groups have started mapping their traditional-use sites with a GIS, making much of this information available in exchange for systems or data development assistance.

## PRIORITY AND INCREMENTAL DATA DEALS

One of the most effective ways to promote data availability is to meet with other active agencies or internal departments and negotiate a deal for priorities or incremental work loads in exchange for cash or data. Incremental costs





for the generation of extra information are often remarkably small — as little as 10 percent of the cost of a separate effort by another party.

While a cash deal allows a company to have direct control over specifications and quality, a data exchange arrangement has the advantage of allowing a company to continue working in its own high priority areas while generating data of use to other interests. The disadvantage of an exchange deal is that it can place a company in a vulnerable position. Under the terms of such an arrangement, a company must work with competent people who can be trusted to perform well and who are expected to continue in business over the long term.

### PROBLEMS IN DATA SHARING

Despite the attractions of data sharing (and Ontario Hydro's active promotion of the idea to meet its need for numerous environmental assessment themes), the idea of partnership has been slow to catch on. In large part, this is due to the problems associated with both internally- and externally-generated GIS data. Some of the impediments to the application of GIS technology, as well as the procedures and strategies developed by Ontario Hydro to effectively manage data sharing, are outlined below.

#### *Differences in Requirements*

Although there are defined standards for base mapping — EMR Canada and Ontario Base Mapping, for example — this is not the case for most environmental and land use thematic mapping. (Some notable exceptions are census data, soil surveys and the Ontario Forest Resource Inventory.) Even where standards are applied, the practices of individual workers may vary, with the result that data polygons on adjacent map sheets are not immediately edge-matchable. And, in most cases, the scale (resolution) or data classifications used in available mapped data do not correspond directly with those used by a potential partner.

One possible solution to this problem is for users' committees to standardize projections, scales and theme definitions. While this is tedious and may require considerable compromise, it appears to be the best long-term solution. After years of advocacy by Ontario Hydro's former Surveys and Mapping Department, the company's GIS users have only recently agreed to facilitate internal data sharing by using a particular set of topographic maps as a 'common base.'

Another solution is to develop some simple rules regarding the potential use of data. For example, it might be best to focus on the resolution of data rather than the published scale. Digital and other data are often created at a very fine resolution and then generalized for hard copy publication, so they can be re-computed during enlargement for enlarged-scale precision. Unless this is known to be the case, however, GIS users are encouraged to observe the 'never enlarge' rule of thumb. Many major planning decisions have been overturned after the presentation of inaccurately enlarged data. It is often possible to enlarge a map as a starting-point and then upgrade the data to satisfactory accuracy at the new scale by means of additional field work and aerial photo interpretation.

Provided the product does not become crowded and illegible, it is usually valid to reduce data in scale. To be

legible, boundaries on a map should not be closer together than about 3 mm. If reduction is necessary, then often certain themes can be combined to lessen the number of points, lines and polygons crowding the product.

Yet another solution is to rephrase the data collection objective or redefine the user's need to take advantage of available data. This can be accomplished by combining data from several sources. At Ontario Hydro, for example, soil suitability for agriculture is computed from soil survey maps using algorithms that take into account other data pertaining to slope and drainage. Great care must be taken with these computed combinations, however, to ensure that errors are not compounded.

Some information — such as forest cover — can be quickly updated using remote sensing. In a comprehensive study of remote areas of northern Ontario that are subject to heavy logging, Ontario Hydro used satellite image analysis to 'deduct' areas that had been clear-cut since the last forest inventory mapping was published and to 'add' new access roads. Airborne video is another quick and cheap tool for updating land use maps.

#### *Differences in Professional Standards*

In the late '70s and early '80s there was a surge of interest in the accuracy of thematic maps and the development of techniques for accuracy checking. While most planners have been raised to expect a high standard of precision and reliability in base maps (NTS maps or USGS quadrangles), the same standards are not applicable for much of the published thematic data. If "accuracy" is defined as the probability that a random spot is what the map says it is, then thematic map accuracy often falls within the 70 to 90 percent range. In some applications, the 'only available' or 'best available' information argument may be acceptable. But, increasingly, the onus is on the user to employ information of a quality that reflects the importance of the decision being made.

For data that may be used again or provided to others, Ontario Hydro follows a data documentation procedure. Included is the basic information — methods used, date scale/resolution, purpose for creation and so on — that would be needed by other users to evaluate the utility of the data for their purpose. Most importantly, it includes the name of a contact person available to discuss a potential use. Most thematic cartographers are conscious of their reputations and will gladly review and comment on a proposed use to ensure its appropriateness.

#### *Differences in Digital Data Standards*

One of the most common yet avoidable problems associated with digital data sharing is differences in data format. Software companies are gradually becoming aware of users' needs and are making some efforts to provide 'translation' packages. Where these are still unavailable, the slow committee process can be used in and between organizations to agree on a particular format. In Ontario, the Ministry of Natural Resources — a major source of public map data — adopted two major vendor GIS systems (Arc/Info and InterGraph), and major users in Ontario Hydro followed suit.

Despite salespitch promises, available translation packages may require more effort than expected to achieve full efficiency. Over the past few years, two GIS users in Ontario Hydro have worked diligently to achieve practical transfer of data between the Arc/Info and Intergraph systems, using the data format "ISIF". Work is under way to link both effectively to the SPANS/Tydac systems. A full interchange between Arc/Info and the Dipix/Aries satellite image analysis system was developed in a partnership between Hydro staff and Dipix staff. It is still difficult to move data freely in all directions between major GIS systems, desktop publishing and large colour printer/plotters to realize potential benefits in preparing presentations and reports. The GIS vendor ESRI has a useful Arc/Info-AutoCad package, and some Hydro units can move data between InterGraph and AutoCad via the "DXF" format with minimal losses.

In addition to data formatting difficulties, the inexperience of data providers is the source of many problems. The most common of these is unclosed polygons, especially at map-sheet boundaries. Because creators tend to think of a single map sheet as an isolated product, they so often overlook this problem. Add to this the difficulty associated with edge-matching thematic interpretations and assembling a seamless database can be an unnecessarily time-consuming task. One solution is to insist that a hard copy be supplied in advance of the digital tapes so edge matches can be checked manually before data are accepted.

*Does Sharing Mean Loss of Control?*

Independent of digital formats is the psychology of data sharing. Although my unit within Ontario Hydro has learned to beg, borrow or buy, many other internal and external GIS users have not. Many GIS users that could put our data to good use decline to do so, afraid that data sharing would mean a reduction in the size of their operation or an internal 'takeover.' Conversely, some sources that have provided us with data have suggested that — by virtue of the transfer of a few map sheets — we should be eliminated! Much of this reluctance or overexuberance arises from a fear of the unknown or misinformed opportunism.

In our experience, building GIS applications rarely displaces a single person: more often it makes it possible for people to do their jobs more comprehensively by allowing them to consider more alternatives quickly and thoroughly. The need for good quality data is mushrooming, and people are more likely to gain than lose extra business through sharing. Sharing can mean, however, that some companies will have to expand their list of data types and services and become more flexible.

An important principle in sharing is that data should generally reside with — and be the responsibility of — the

unit that creates it or pays for its production. Only these groups have the original professional expertise and motivation to design it, interpret it, update it and make recommendations on valid applications. Proposals to build large centralized databases controlled by a separate party should be viewed with a critical eye. Once data are 'in the computer,' they tend to become detached from reality and subject to misuse.

*Legalities: Copyright and Liability*

Ten years ago when my unit in Ontario Hydro first decided to share and sell data, we examined the legal implications of such actions. Although involved, this investigation proved most beneficial. It is surprisingly easy to violate copyrights unintentionally when sharing data. If, for example, a new map is synthesized in a GIS using several input maps — one of which is copyright — the creator would be violating the copyright if the product was then sold or donated without approval. Government agencies in Canada have become very conscious of copyright issues for digital data in recent years, particularly for topographic maps, which are commonly used as a foundation for thematic mapping. In the United States, there is an

on-going public debate over the right of public agencies to copyright, since their operations are publicly funded.

Even where there is no copyright, the distinctive patterns of geographic data make it easy for creators to recognize their own work and claim plagiarism. From an ethical rather than legal perspective, data creation is like any other intellectual matter, and it is professionally ethical to give credit where credit is due.

In light of all this, one unit of Ontario Hydro developed a simple procedure for tracking the content of a database. By following a data audit trail, it is possible to identify products containing another creator's copyright data. A useful practice is to buy an extra hard copy or digital copy of the original data from the publisher on behalf of a client and visibly account for it on invoices to the client. In this way, the GIS service is then acting only as an agent for the client in manipulating his maps. The copyright owner has been given his standard fee and has no further claim on this transaction.

When people sell — or even give away data — they may still carry some legal responsibility for it. If the data do not yield the expected results, a client could try to make the source liable for damages. Some such cases are already before the United States courts. Although failure most often arises from the client's misuse of the data or the sale of the data to a third party who does not have a thorough understanding of what has been purchased, the originator's reputation can be damaged. Since the time and cost of defence are onerous, it is best to avoid problems.



Some GIS users in Ontario Hydro are active participants in the use of their data by other groups, requesting full disclosure of intended purpose by the client and evaluating the validity of the data for that use as a condition of sale or gift. Some groups have been impatient with this approach, threatening action under Freedom of Information and other procedures to obtain information without such discussion, in which case they must assume full responsibility.

One GIS user also puts a disclaimer on all its data, although this offers little protection should there be real negligence. At present, some Hydro units are considering copyrighting all data sold as a means of tracking its use elsewhere, or at least providing counter-protection in the case of misuse.

**GIS DEVELOPMENT PARTNERSHIPS**

A number of government agencies and universities attracted by some of Ontario Hydro's GIS results have proposed joint development projects or asked for partial funding to create something for the company. Although these partnerships have always sounded wonderful in theory, in practice they have met with limited success. Budgets get cut, enthusiasts move on, managers change their priorities and some partners just do not perform well. After learning the hard way, I am now an advocate of 'parallel pathway co-operation.' This consists of reviewing jointly all required development and then having each party choose a package that is at the same time a high priority for them and complementary to the choice of the other. It is best to choose packages that stand alone; those that will be useful to the company regardless of whether the other party finishes its package.

Sharing data and applications development can be a risky business, but there are ways around almost every problem that might arise. The most important thing is to maintain a positive attitude towards sharing for the greater good of your company and society as a whole. ❖

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**FURTHER READING**

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# 3D DIGITAL MODEL MAKING

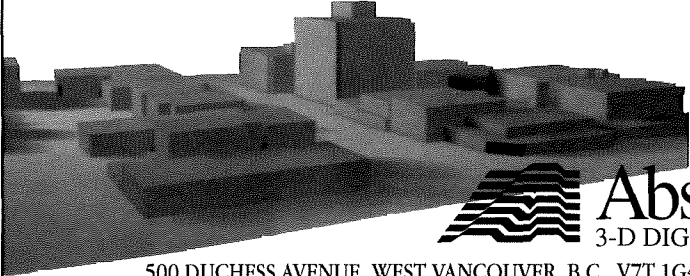
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# WATERSHED PLANNING

## USING A GIS TO MAKE SUSTAINABLE DECISIONS

... GREG RADFORD

### RÉSUMÉ

LA GESTION ET LA PLANIFICATION DE L'ENVIRONNEMENT ONT BEAUCOUP CHANGÉ AU COURS DES DIX DERNIÈRES ANNÉES. ALORS QUE DANS LE PASSÉ ON S'INTÉRESSAIT SURTOUT AU ZONAGE ET AU CONTRÔLE DE L'OCCUPATION DU SOL, LA NÉCESSITÉ D'INTÉGRER TOUS LES ASPECTS DU BASSIN HYDROGRAPHIQUE AU PROCESSUS DE PLANIFICATION GAGNE EN POPULARITÉ. LA PLANIFICATION DES BASSINS HYDROGRAPHIQUES DANS UN PROCESSUS CONTINU ET EN VERTU D'UNE PRISE DE DÉCISIONS EFFICACE REPOSE SUR L'INFORMATION LA PLUS RÉCENTE. UN SYSTÈME D'INFORMATION GÉOGRAPHIQUE (SIG) EST UN OUTIL DE GESTION PUISSANT QUI PERMET AUX URBANISTES DE METTRE EN VALEUR TOUTES LES RESSOURCES HYDROGRAPHIQUES, EN TENANT COMPTE À LA FOIS DES ASPECTS PHYSIQUES ET DES CARACTÉRISTIQUES DE LA POPULATION.

Over the past decade, there has been an increasing need for more effective watershed planning and development. While past watershed planning practice focussed on land use zoning and water quality management through point-source monitoring, this approach did not fully integrate all of the aspects of a watershed into the planning process. In keeping with traditional economic development, watershed planning proceeded with little understanding or regard for environmental concerns. To incorporate these concerns in the decision-making process, a paradigm shift towards a more holistic planning and management approach — sustainable development — has been developed.

The goals of sustainable development cannot be achieved without the protection, improvement and rehabilitation of watersheds. In recognition of this, many levels of government have turned their attention and resources to the field of watershed planning and management. Initially, these planning efforts have been reactive in nature — immediate but isolated responses to perceived problems. Planning strategies have focussed mainly on control and have been based on land use development restrictions. Although this approach has protected watersheds from

some harmful development, there has been limited planning directed by sustainable development concerns. This is largely due to the fact that many management strategies increasingly restrict present-day operations, which in turn affects employment opportunities. This attitude is beginning to change, however, as the importance of watershed ecosystems becomes more widely understood and decision-makers realize that today's decisions affect the quality of future resources.

A considerable obstacle to effective watershed planning is the increasing amount of environmental data required and available in computer format. Many planning departments have failed to keep pace with recent advances in data accumulation and manipulation and population growth, creating the need for more advanced and integrated systems. The Geographic Information System (GIS) has emerged as the leading computer-based technology that will enable planners and managers to more effectively organize environmental information.

### PLANNING AT THE WATERSHED LEVEL

Watersheds are defined as "those lands from which all surface water flow eventually collects in a common lake or stream." Watershed planning, then, is the manipulation of watershed resources in a way that does not adversely affect soil and water resources. Watershed planning must balance the social, economic and institutional factors operating within and outside of the watershed area.

All watersheds contain various natural resources — minerals, soil, water, forests and wildlife. In developing and planning a watershed, natural resources will have both complementary and competitive uses. The key is to use all resources as efficiently as possible with minimum overall disturbance to the watershed. Although they may not always be the decision-makers on resource use, watershed planners are tasked with monitoring and carrying out practices that will encourage complementary uses and suggest preventive and protective measures for potentially harmful ones.

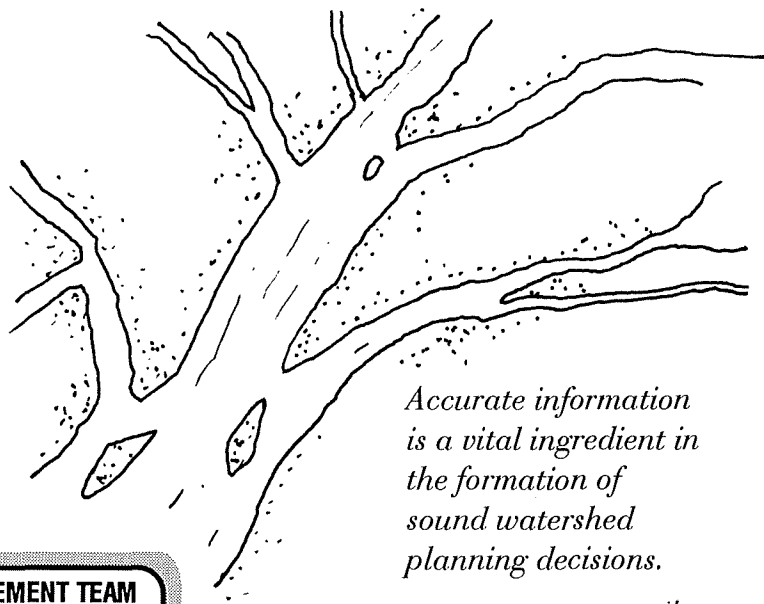
Inappropriate land use is a major concern at the watershed level. Over-use or improper use of land may cause soil erosion, land degradation and contamination, while under-use may have adverse economic implications. Accordingly, instances of misuse — their location and severity — must be identified. Such information may be obtained by superimposing present land use maps onto land capability maps and water resource maps using a GIS. This is useful since a fundamental principle of watershed planning is that land should be used according to its capability. Any use beyond this capability (over-use) should be discouraged or pro-

hibited. Below this capacity (under-use) represents an economical loss and is subject to further adjustment. Experience has shown that both over- and under-use may exist in the same watershed.

With the formulation and adoption of comprehensive watershed management plans being the ultimate goal, watershed planning should be undertaken at the national, regional, watershed and community levels. These plans should be designed in consideration of the missions of the various governments, as well as the interests of those affected. They should be developed with input from a number of professional disciplines and should take into account institutional, economic, social and other impacts (Goodman and Edwards, 1992). The steps required in the development and establishment of a watershed management plan are illustrated in Figure 1. As in any planning process, allowances must be made to accommodate modifications to the plan as circumstances change.

**THE WATERSHED DECISION-MAKING PROCESS**

Since decision-making in watershed planning incorporates resources for many purposes, a multi-disciplinary approach is essential. Watershed planning is an on-going process, and decision-making must be based on the most current and up-to-date in-



*Accurate information is a vital ingredient in the formation of sound watershed planning decisions.*

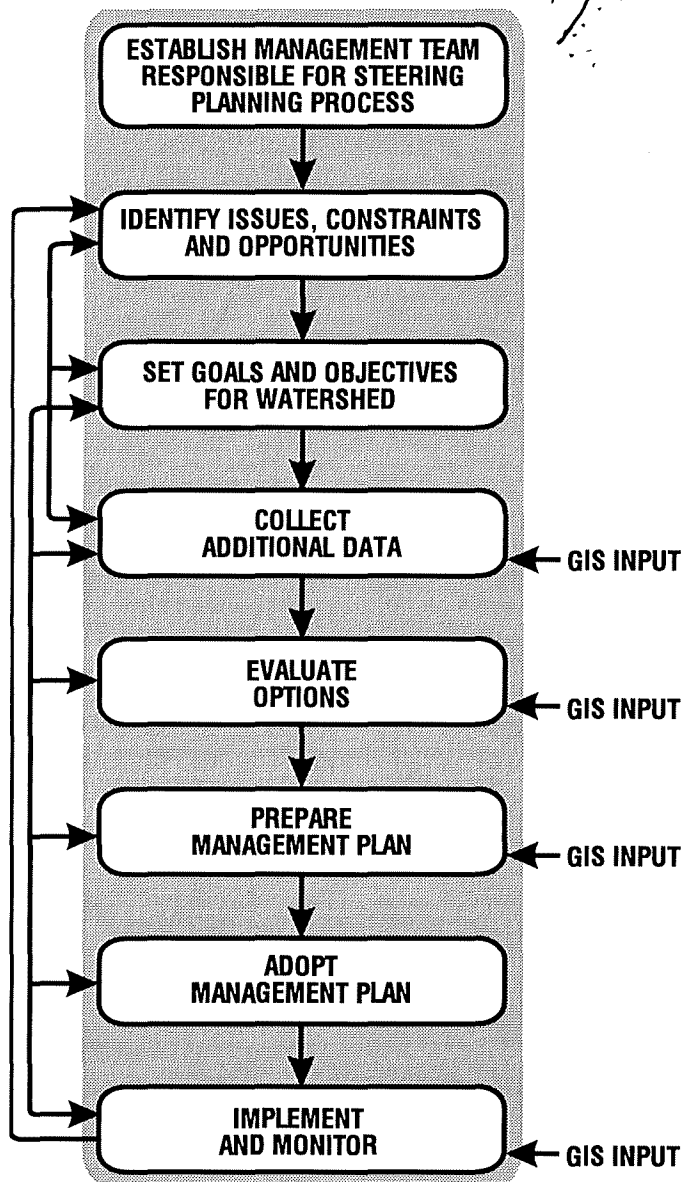
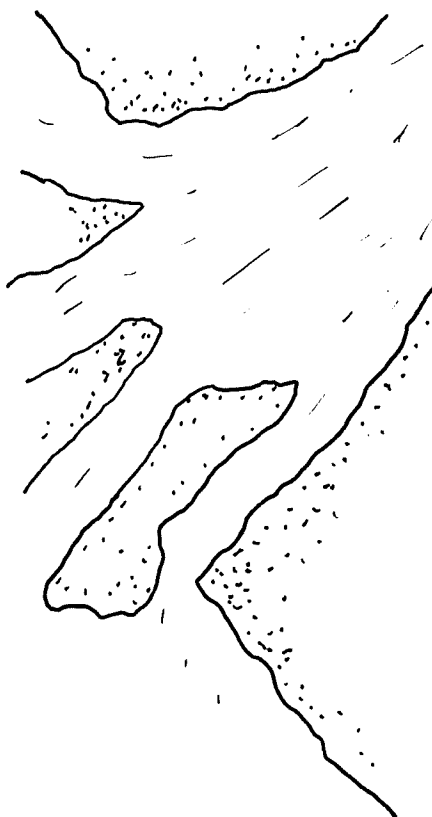


Figure 1. Watershed planning approach.

formation. New elements — both man-made and those that occur naturally — can become factors at any time. It is the planner's responsibility to make government authorities aware of the continuous and flexible nature of the process. Watershed management must be comprehensive and include both physical concerns (the extent of the watershed, the variety and pattern of land use, natural resource characteristics, concerns of water quality and transportation routes) and human population characteristics (land ownership patterns, subdivision activity and lot size, development/economic activity, population characteristics, inventory of existing controls and services based on present and future demand).

Effective decision-making is dependent on the quality of data available at the time the decision is made. Watershed plans, maps and sampling data



that relate to both human and physical resources must be maintained, updated and accessible. However, as governments downsize, there is an increasing need to do more with less. A Geographic Information System (GIS) is a management tool that can satisfy both of these demands, facilitating proper management of watersheds within set budgets.

As illustrated in **Figure 1**, there are many stages in the development of a watershed management plan at which information management and the evaluation of management options can be enhanced by using a GIS. And, according to a user-needs study, establishing and maintaining a GIS is more cost-effective than other management methods.

### WHAT IS A GIS?

A Geographical Information System is a database management system that facilitates the storage, retrieval, manipulation and analysis of spatial and temporal data and its display in the form of maps, tables and figures. The information in a GIS describes entities that have a physical location and extent in some spatial region of interest, while queries involve identifying these entities based on their spatial and temporal attributes and relationships between entities (Ooi, 1987). Geographical data refer to spatial data in terms of their position with respect to a known coordinate system, their attributes (which are unrelated to their position) and their spatial inter-relationships with one another (Burrough, 1986).

A well-designed GIS has a number of capabilities: to access large volumes of data; to link or merge one data set to another; to analyze spatial characteristics of data; to quickly and inexpensively update; to model data and access alternatives; and to generate new and flexible forms of output, such as tailor-made maps and graphs (DOE, 1987).

### APPLYING A GIS

A GIS provides watershed planners with the capability to describe, explain and predict spatial patterns and processes using large data sets in the development of realistic models for accurate environmental management. In general, a GIS can be used to more efficiently assess and present geographical data, to provide up-to-date and accurate modelling capabilities and to rapidly generate superior realistic landscape simulations (Radford, 1991).

For watershed planning, a GIS offers the opportunity to integrate soil, land use/land capability, water resource and socio-economic data into a single system. A GIS can be used to conduct both qualitative and quantitative studies with improved geometric resolution and spatial relationship information. Because a GIS is easily updated, it is an excellent resource for providing information for use in the decision-making process. A watershed planner can quickly manipulate the most current spatial and temporal data to produce a number of management alternatives — and then select the most suitable one.

Summarized according to their principal functions, the major advantages of using a GIS in watershed planning are as follows:

- map creation/reproduction;
- database editing/updating;
- database query;

- overlay analysis;
- data conversion;
- measurement functions;
- neighbourhood functions;
- network/routing functions; and
- modelling.

Before developing a GIS system, planners must consider a number of factors, including which system best meets the requirements, the cost of initial acquisition, system use (whether it will be limited to present planning work or used in additional work), the cost of converting existing digital file data and proper maintenance (including training or the hiring of skilled operators).

### TOWARDS IMPROVED DECISION-MAKING

Accurate and up-to-date information is a vital ingredient in the formation of sound watershed planning decisions. In light of increased understanding of watershed ecosystems, this is especially true today. Improved watershed information collection and dissemination plays an important role in the decision-making process. The ability to seek — and obtain — relevant watershed information in a timely manner allows for more effective program delivery (O'Neil *et al.*, 1993). By integrating all forms of data into a GIS, planners can assemble and analyze a variety of watershed management scenarios and then choose appropriately between them.

A GIS makes information required on a daily basis more accessible to watershed planners. And since this information is available in a variety of forms, planners can choose the one most appropriate for the task at hand, enhancing their decision-making capability. In the final analysis, the only limitation of a GIS is the planner's imagination. ♦

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# **L**ES SYSTÈMES D'INFORMATION GÉOGRAPHIQUE ET LE RÉSEAU ROUTIER MUNICIPAL

## **DES APPLICATIONS EN SÉCURITÉ ROUTIÈRE<sup>1</sup>**

... PIERRE MAURICE,  
DENISE PICHE,  
LOUISE MARIE  
BOUCHARD,  
CLAUDE DUBÉ,  
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MARC LARIN ET  
MARIUS THÉRIAULT<sup>2</sup>

### **SUMMARY**

**THE ROAD NETWORK REPRESENTS A LARGE PORTION OF A MUNICIPALITY'S RESPONSIBILITIES AND EXPENSES. THE DIVERSITY OF INFORMATION TO BE PROCESSED AND THE NUMBER OF PEOPLE INVOLVED IN THE PLANNING AND MANAGEMENT OF ROAD NETWORKS MAKE MANAGEMENT INFORMATION SYSTEMS AN ATTRACTIVE TOOL. RESEARCH TEAMS WORKING WITH THE CITIES OF BEAUPORT AND QUEBEC HAVE DEVELOPED AND EXPERIMENTED WITH A GEOGRAPHIC INFORMATION SYSTEM, WHICH CAN HELP SMALL- AND MEDIUM-SIZED MUNICIPALITIES MAKE APPROPRIATE DECISIONS WITH RESPECT TO ROAD SAFETY AND THEREBY CONTRIBUTE TO THE STUDY OF THE RELATIONSHIP BETWEEN ROAD DEVELOPMENT AND SAFETY.**

**A**u Québec, les accidents routiers sont la première cause de décès chez les moins de trente ans (Bourbeau *et al.*, 1991) et la troisième pour l'ensemble de la population. Malgré l'amélioration du bilan routier au cours des dernières années, il y a quand même eu, en 1991, 171 024 accidents sur les routes du Québec; 1 006 personnes ont été tuées et 50 997 blessées, dont 7 039 grièvement (SAAQ, 1992). On estime à près d'un milliard de dollars le montant versé, de 1986 à 1988, en indemnités, en frais médicaux, en soins hospitaliers et autres (RAAQ, 1989). Cette somme n'inclut pas les coûts indirects telle la perte de productivité. Globalement, en tenant compte de l'ensemble des coûts directs et indirects, en 1989, on estimait à environ 2,5 milliards de dollars le coût de l'insécurité routière au Québec (Bordeleau, 1992).

Compte tenu de leurs responsabilités dans l'aménagement du territoire, dans la conception et la surveillance du réseau routier et dans la gestion de la circulation, les municipalités sont régulièrement impliquées dans des décisions touchant la sécurité routière. Toutefois, leur surveillance des accidents routiers ainsi que le dépistage des lieux dangereux sont rarement systématiques. De plus, les modèles d'intervention et les normes qu'elles appliquent dans la conception et la gestion du réseau pour en assurer la sécurité ont généralement été adoptés en l'absence d'une bonne connaissance des faits et leur impact a rarement été évalué (Hauer, 1988). Ceci signifie qu'elles interviennent sans savoir si les lieux choisis sont les plus susceptibles d'amélioration et si les moyens adoptés sont les plus efficaces.

Une masse importante d'informations est accessible pour aider les municipalités dans leurs décisions et réduire la part d'arbitraire dans les choix qu'elles font. Les rapports d'accident de véhicules routiers, colligés au Québec par la Société de l'assurance automobile (SAAQ), décrivent les caractéristiques et circonstances des accidents. Leur localisation permet de relier cette information à d'autres informations détenues par les municipalités, cette fois sur l'environnement dans lequel ils se produisent (comptages routiers permanents ou ponctuels, relevés de vitesse et enquêtes origine-destination, plaintes et requêtes des citoyens, utilisation du sol, lotissement et contour du bâti, caractéristiques de l'emprise routière, réglementations routières, caractéristiques socio-économiques). La complexité de cette information, en particulier celle sur la dimension environnementale de l'accident et sur la dynamique spatio-temporelle des déplacements, explique qu'on n'en ait fait qu'un usage limité jusqu'ici. Les systèmes de gestion d'informations géographiques (SIG) ouvrent cependant aujourd'hui des perspectives intéressantes pour l'exploitation de cette information et la prise en compte de la sécurité dans les décisions des municipalités.

Cet article présente deux expériences de création de SIG pour l'intervention en sécurité routière dans deux municipalités de la communauté urbaine de Québec, soit Beauport et Québec. Les deux municipalités étant de taille différente et possédant donc des moyens différents, la comparaison est intéressante. La Ville de Beauport, avec une population de 70 000 habitants a des ressources plus limitées que Québec avec ses 165 000 habitants. En 1990, contrairement à la deuxième, la première n'était pas encore dotée d'un système géomatique pour la représentation de son territoire.

### **L'EXPÉRIENCE DE BEAUPORT**

L'initiative de l'expérience de Beauport vient du Département de santé communautaire de l'hôpital de l'Enfant-Jésus qui, à l'instar des autres DSC du Québec, s'intéresse aux traumatismes routiers comme problème de santé publique. En 1991, la Ville s'est montrée intéressée à expérimenter un outil d'aide à la prise de décision en matière de sécurité routière qui repose sur un programme de surveillance des accidents faisant usage de l'information contenue dans les rapports d'accident.

Trois services de la Ville sont impliqués en sécurité routière, soit la protection publique (police), les travaux publics et l'urbanisme. Avant l'élaboration du programme, on observait peu de communications horizontales entre ces services dans ce domaine. Les données objectives sur les accidents étaient peu utilisées, les principales sources d'intervention étant les plaintes des citoyens adressées au pou-



voir politique ou directement aux services concernés, ainsi que les observations faites par les patrouilleurs et les employés d'entretien.

L'équipe de recherche a donc conçu un programme de surveillance des accidents basé sur l'utilisation d'un SIG, qui permet de localiser exactement les accidents et d'en décrire les caractéristiques, notamment le contexte spatial et temporel. L'objectif général était d'aider à la prise de décision concernant la sécurité routière, en :

- colligeant d'une manière continue les données concernant les accidents qui surviennent sur le réseau routier;
- produisant des analyses descriptives de ces données; et
- diffusant les résultats auprès des intervenants en sécurité routière et des décideurs municipaux par le biais de rapports mensuels, trimestriels et annuels.

La Figure 1 décrit les principales composantes du programme.

Les informations cartographiques et thématiques sont intégrées à l'intérieur d'un module de traitement de l'information constitué de différents logiciels dont un système de traitement de base de données localisées (MapInfo), une

base de données (dBase III+), des chiffriers (Lotus 1-2-3 et Excel) et un logiciel statistique (SAS).

Des rapports sous forme de feuillets d'information sont générés mensuellement, trimestriellement (voir Figure 2) et annuellement avec des graphiques décrivant la nature et les circonstances des accidents et des cartes d'échelles variables présentant la distribution des accidents sur le territoire et repérant les endroits à problèmes. L'évolution du nombre d'accidents et la nature des dommages sur une période donnée permettent de préciser l'importance du problème et son évolution dans le temps. Les circonstances et les lieux d'accidents aident à repérer encore plus précisément les zones, les endroits et les périodes pour lesquels des mesures correctives devraient être envisagées. Quant aux données relatives au type de véhicule ou aux caractéristiques des victimes et des conducteurs, elles permettent de préciser des groupes cibles et d'adapter l'information à la communauté.

Compte tenu de la rareté des ressources et du contexte organisationnel entourant la sécurité routière dans les petites et moyennes villes du Québec, les caractéristiques d'utilité, de simplicité, de flexibilité, d'acceptabilité et d'opportunité temporelle ont été recherchées lors de la conception du SIG. À ces fins, le programme devait :

- produire une information permettant de mieux documenter les problèmes et d'éclairer les décisions en matière de sécurité routière (utilité);
- s'appuyer sur des informations facilement accessibles, demander peu de modifications dans les tâches des intervenants municipaux et n'exiger que des compétences ou habiletés déjà existantes dans les villes (simplicité);
- répondre à des besoins et technologies diversifiés (flexibilité);
- s'opérer sans changements organisationnels importants, demander un investissement initial de moins de 10 000 \$ et avoir des coûts de fonctionnement admissibles dans le budget régulier des services intéressés (acceptabilité); et
- produire une information accessible aux différents intervenants au moment où ils en ont besoin (opportunité temporelle).

L'évaluation de ce programme a démontré des retombées positives à la fois sur la dynamique organisationnelle et sur les interventions en sécurité routière. D'une part, la mise sur pied d'un comité consultatif pour superviser le programme a favorisé les communications interservices en cette matière. Autour de la même information, les intervenants peuvent désormais partager leur compréhension des problèmes et rechercher des solutions globales pouvant impliquer

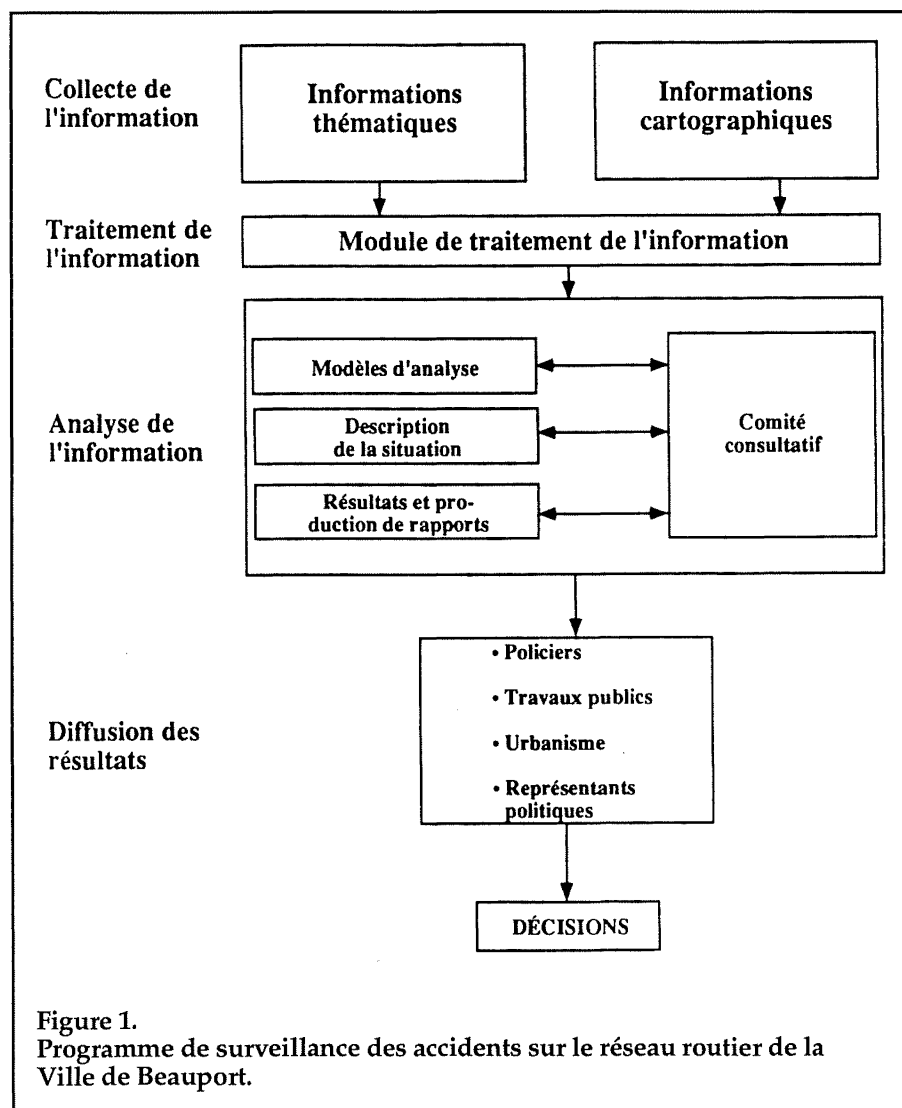


Figure 1. Programme de surveillance des accidents sur le réseau routier de la Ville de Beauport.

## LA SÉCURITÉ ROUTIÈRE À BEAUPORT

Caractéristiques et localisation des accidents sur le réseau routier de la Ville

Bulletin trimestriel

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### CONNAÎTRE LES ACCIDENTS ROUTIERS AFIN DE MIEUX INTERVENIR

Chaque année, les accidents routiers sont responsables d'un nombre considérable de morts et de blessés graves. Depuis 1986, sur le territoire de la Ville de Beauport, il se produit annuellement quelque 2 000 accidents routiers dont plus de 250 avec blessures corporelles et près de quatre accidents mortels. Globalement, les conséquences de ces accidents sont désastreuses pour la société.

Contrairement à la croyance populaire, les accidents ne sont pas toujours distribués au hasard. On remarque en général sur le réseau routier des zones de concentration d'accidents qui, année après année, sont pointées du doigt par les citoyens et les intervenants municipaux. Les accidents ne se répartissent pas non plus uniformément dans le temps et on remarque en général des périodes de la journée, de la semaine ou de l'année où les risques sont plus importants.

Ces constatations nous amènent à conclure que le problème des accidents de la route est fortement associé non seulement au comportement du conducteur, mais également à des facteurs extérieurs.

C'est dans cet esprit que le Département de santé communautaire de l'hôpital de l'Enfant-Jésus (DSC) s'est associé aux autorités municipales de la Ville de Beauport afin de mettre sur pied une méthode visant à surveiller les accidents qui se produisent sur le territoire de la Ville. Un groupe de travail formé de représentants de la Ville de Beauport, du DSC et de l'Université Laval a été formé pour piloter le projet.

Une association qui porte ses fruits...

C'est ainsi que les données concernant les accidents routiers sont expédiées régulièrement au DSC par le service de la Protection publique. Par ailleurs, le

service des Travaux publics a fourni l'expertise technique et les informations disponibles sur les volumes de circulation. Finalement, le service de l'Urbanisme a fourni les cartes et autres informations pertinentes à la localisation des accidents.

Diffusion de l'information...

Quatre formats de rapport seront produits. À chaque mois, un feuillet résumant la situation du mois précédent sera distribué au service de la Protection publique. Tous les trois mois, le feuillet sera remplacé par un rapport trimestriel qui exposera la situation de façon plus détaillée. Ces rapports trimestriels seront distribués aux Travaux publics et à la Protection publique. Le troisième type de rapport sera produit une fois l'an et consistera en une analyse rétrospective des deux dernières années. Il sera distribué à l'ensemble des intervenants de la Ville. Finalement, il sera possible d'obtenir, sur demande, des rapports « topo » couvrant une période précise ou concernant un endroit particulier.

C'est avec joie que nous vous invitons à parcourir ce rapport qui, nous le souhaitons, vous sera grandement utile lors de vos interventions sur le réseau routier et vous aidera à avoir une meilleure connaissance de votre territoire. Naturellement, vos commentaires et suggestions seront les bienvenus; vous êtes invités à les faire parvenir à l'adresse apparaissant à la fin de ce rapport. Bonne lecture!

### Sommaire

Connaître les accidents routiers afin de mieux intervenir	1
Les accidents sur le territoire de Beauport entre mai et juillet 1991	2
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Produit par le DSC de l'Hôpital de l'Enfant-Jésus en collaboration avec la Ville de Beauport

Page 1

Figure 2. Exemple de la première page des feuillets d'information trimestriels distribués dans les Services de la Ville de Beauport.

différents services. D'autre part, la disponibilité des données a permis d'identifier et de décrire des problèmes jusque là ignorés. Elle a fait naître des demandes d'informations plus poussées pour mieux orienter diverses interventions, telles que l'aménagement d'une intersection ou d'une artère, certaines activités de surveillance policière, l'élaboration d'un règlement de zonage et la réponse sur une base rationnelle aux plaintes des citoyens.

### L'EXPÉRIENCE DE QUÉBEC

Le Service de la circulation et du transport de la Ville de Québec est un des pionniers de la sécurité routière parmi les municipalités du Québec. On y saisit tous les rapports d'accidents survenus sur le territoire depuis le début des années 1980. Les données sont colligées et les analyses sont diffusées sous forme de rapports annuels ou bisannuels depuis 1983. Cette information est régulièrement utilisée

par le Service dans le choix des lieux et types d'intervention, et pour sensibiliser la population, les décideurs et les autres intervenants, tels les policiers et le Service de l'urbanisme.

En 1990, le Service commandait à Synertech, un cabinet conseil en systèmes de gestion, un système intégré de gestion de l'information (SIGI) qui lui permettrait de saisir plus efficacement les rapports d'accident, d'en valider le contenu, d'établir des relations avec une sélection de données contenues dans le fichier central des descripteurs du réseau routier, ainsi que dans des fichiers sur les conditions météorologiques et d'éclairage, de générer automatiquement de nouvelles variables (notamment les modèles d'accident, et le numéro de tronçon sur lequel survient l'accident), de produire rapidement des rapports mensuels et annuels et de gérer des niveaux critiques d'accident aux intersections. Le système devait avoir un bon temps de réaction, ce qui impliquait une décentralisation du traitement de l'information depuis l'ordinateur central de la Ville, sur lequel sont localisées la plupart des banques de données sur le réseau routier et le territoire, vers les micro-ordinateurs du Service de la circulation.

Le SIGI mis en place s'appuie sur le logiciel PC Focus. Il est très performant, mais limité par l'absence d'information à références spatiales. Ainsi, pour identifier les lieux d'accidents, croiser les variables concernant le milieu et les accidents et étudier des zones et des axes urbains, l'utilisateur doit recourir à une codification alphanumérique complexe. En outre, le système ne permet pas la représentation cartographique des lieux d'accidents.

L'intérêt du Service pour la spatialisation de ses données porte en partie sur les propriétés perceptives de la cartographie: simultanéité de lecture d'un ensemble de données, rappel direct des propriétés du milieu, saisie intuitive des propriétés dynamiques de l'espace et facilité de communication. Il souhaite de plus mettre en relation les données d'accident et diverses couches d'informations accessibles sur le système géomatique de la Ville (forme du réseau routier, signalisation et équipements routiers, forme du bâti, occupation du sol, etc.)

En vue d'étudier la relation entre la forme urbaine et les accidents, l'équipe de recherche de l'École d'architecture de l'Université Laval a développé un tel système d'information à références spatiales en tenant compte de deux contraintes importantes :

- la capacité de traitement d'un nombre important d'observations; et

- l'adoption d'un système compatible avec les systèmes de gestion de l'information de la Ville de Québec.

La **Figure 3** présente l'architecture pleinement déployée du système. Les données alphanumériques thématiques sont transformées et traitées dans SAS. Pour localiser les accidents, des coordonnées spatiales sont générées pour chaque tronçon et intersection du réseau routier dans MicroStation, le logiciel de CAO et de géomatique adopté par la Ville. MicroStation n'est pas à proprement parlé un SIG, mais il s'avère approprié pour nos recherches sur les rapports entre la forme urbaine et les accidents et assez souple pour l'étude d'un phénomène comme les accidents routiers.

Dans son état actuel, le système intéresse les intervenants en raison de ses capacités de représentation et d'accès direct aux observations se rapportant à n'importe quel lieu sur le territoire (point, axe ou aire). Au plan de la recherche, la représentation cartographique a permis d'entreprendre des travaux exploratoires sur le rapport entre la forme des ensembles résidentiels et la sécurité routière (voir **Figure 4**) et sur l'aménagement des grands axes routiers caractérisés par la diversité de l'utilisation du sol, des types de circulation et des paysages.

### LA MISE EN PLACE DE SYSTÈMES D'INFORMATION GÉOGRAPHIQUE DANS L'ORGANISATION MUNICIPALE

Les expériences de Beauport et de Québec appellent deux commentaires particuliers sur l'implantation de SIG thématique dans les municipalités. Le premier concerne l'opposition apparente entre la planification stratégique de la géomatique dans l'organisation municipale et l'adoption de modules thématiques relativement autonomes.

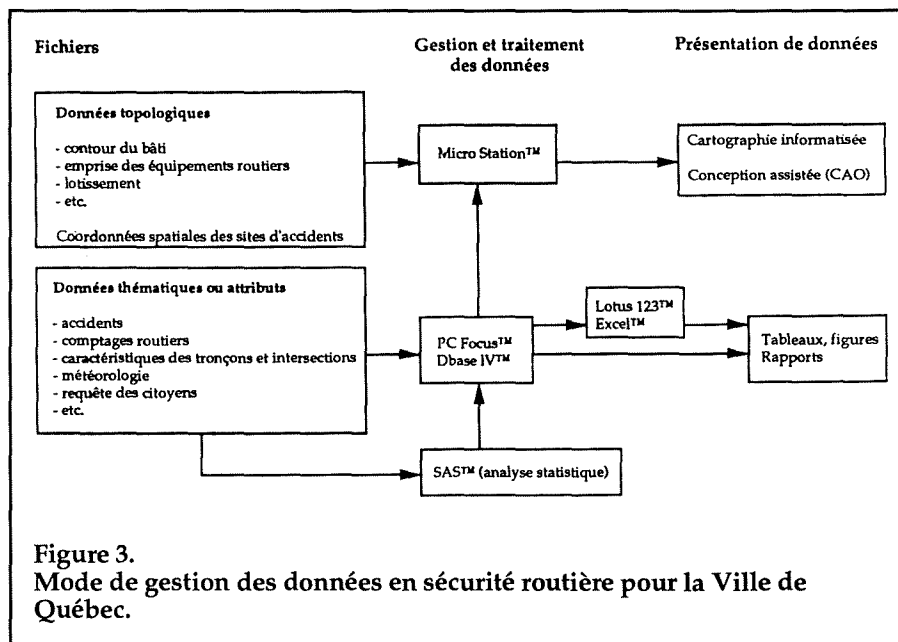
L'implantation de la géomatique dans une municipalité est encore un processus lourd et lent, qui met l'accent sur la solution de problèmes techniques et informatiques en vue d'assurer la qualité des données, l'intégration des composantes du système et sa flexibilité en vue de son expansion future. Or, l'expérience de Beauport montre qu'un SIG thématique peut être rapidement mis en place et donner accès à une information utile, à des coûts limités. Dans la pratique actuelle, on tend cependant à évoquer l'intégration de l'ensemble du système pour retarder l'adoption de composantes autonomes, qui ont l'avantage de répondre rapidement aux besoins des usagers. Par exemple, une municipalité comme Beauport, qui n'a pas encore de système de géomatique, ne reprendra pas immédiatement à sa charge l'opération d'un SIG en sécurité routière, préférant intégrer son adoption dans sa programmation géomatique d'ensemble. Lorsqu'une municipalité a déjà un tel système, comme c'est le cas de Québec, sa mise au point et son opération laissent peu de ressources disponibles pour mettre au point un module thématique pour la sécurité routière.

On peut se demander s'il n'y a pas lieu de reconsidérer la priorité accordée à la gestion centralisée des systèmes informatiques, pour une plus grande ouverture à des instruments informatiques décentralisés et flexibles, qui puissent répondre aux besoins pratiques ainsi qu'aux particularités des données et des analyses propres à une thématique urbaine particulière.

Notre deuxième commentaire porte sur la conception souvent univoque que les manuels offrent de la fonction et de l'implantation d'un SIG dans une organisation. On y propose généralement une planification linéaire, qui commence avec l'expression des besoins des usagers éventuels et se termine avec l'implantation de l'outil informatique. Sans être dépourvue de sens, une telle conception néglige que l'outil lui-même peut provoquer des changements dans une organisation et dans la façon de percevoir les problèmes, puis susciter de nouveaux intérêts, des collaborations interservices, ainsi que des innovations. Elle ne favorise pas non plus la prise en compte des développements récents dans le traitement de l'information à références spatiales car, faute de bien cerner le plein potentiel offert par les SIG, les usagers définissent, en général, des besoins qui correspondent à ses fonctions les plus élémentaires. Enfin, un SIG sera d'autant plus pertinent pour la pratique qu'il prendra aussi appui dans les connaissances récentes propres aux thématiques urbaines pour lesquelles il sera utilisé.

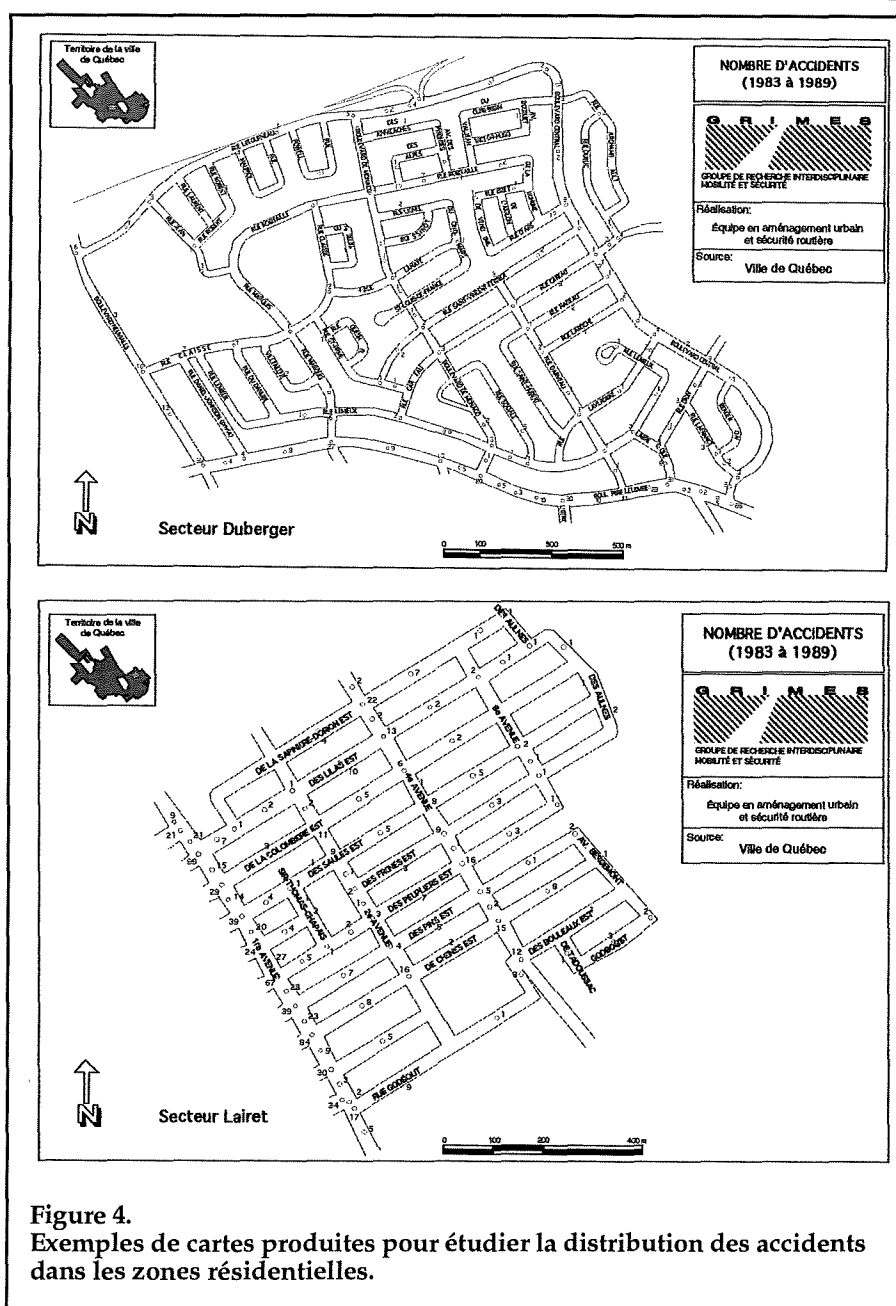
### LE DÉVELOPPEMENT DES SYSTÈMES D'INFORMATION GÉOGRAPHIQUE POUR LA SÉCURITÉ ROUTIÈRE

Nos conclusions rejoignent donc celles de plusieurs publications récentes qui soulignent que les organisations et les concepteurs de logiciels et de systèmes font un usage limité du potentiel des SIG et que ceux-ci sont encore sous-développés en matière d'analyse spatiale et d'aide à la prise de décision (Maguire, Goodchild et Rhind, 1991; Worrall, 1991; Scholten et Stillwell, 1990). On s'en sert essen-



**Figure 3.**  
Mode de gestion des données en sécurité routière pour la Ville de Québec.





**Figure 4.**  
Exemples de cartes produites pour étudier la distribution des accidents dans les zones résidentielles.

tiellement pour améliorer l'efficacité dans la gestion de l'information (conservation, mise à jour, accès, compilation et présentation). En pratique, pour ne pas retarder indéfiniment l'accès à l'information, il y a probablement lieu de décomposer les objectifs d'un SIG et d'accepter que son développement et son implantation se feront en plusieurs étapes (Figure 5).

Nous avons pu constater qu'il y a un gain appréciable pour une organisation dès le premier stade de développement d'un SIG en sécurité routière, aussi élémentaire soit-il. La simple description et la représentation cartographiée des accidents routiers font prendre conscience du problème, permettent un premier dépistage des lieux et périodes où se concentrent les événements et facilitent la surveillance continue du milieu, ce qui est déjà une base pour

stimuler de nouvelles orientations dans les interventions. Par exemple, la connaissance de la distribution des accidents dans l'espace, selon l'heure du jour et le jour de la semaine, peut aider à planifier les cédulas de patrouille policière.

Toutefois, cette information brute peut être trompeuse. Les concentrations d'accidents ne sont pas un indice satisfaisant de l'insécurité, ni un indicateur adéquat des lieux où intervenir dans le meilleur rapport coûts-bénéfices (Hauer et Persaud, 1984) et la simple réduction du nombre d'accidents à la suite d'une intervention n'est pas non plus une bonne mesure de sa performance (Hauer et Persaud, 1982). Pour des estimations adéquates, il faut tenir compte de phénomènes comme les débits de circulation, la fluctuation aléatoire du nombre d'accidents d'une année à l'autre et la migration des accidents à la suite d'interventions.<sup>3</sup> Dans une deuxième phase de développement, les SIG en sécurité routière doivent donc intégrer des méthodes plus sophistiquées d'identification des lieux dangereux et d'évaluation des interventions, telles l'analyse multivariée et la méthode empirique de Bayes (voir par exemple Hauer, 1992, et Oppe, 1992), et contrôler, dans la mesure du possible, l'effet des migrations d'accidents (Mountain et Fawaz, 1992). Pour améliorer le diagnostic, l'explication de l'insécurité doit aussi reposer sur l'analyse multivariée de diverses données sur le milieu disponibles dans les municipalités (Henning-Hager, 1986) et sur des analyses exploratoires des phénomènes d'interactions spatiales (Openshaw, 1990).

Toutefois, même s'il existe des méthodes d'analyse pour faire d'un SIG en sécurité routière un meilleur outil d'évaluation, le transfert des connaissances requises pour leur manipulation et l'interprétation des résultats qui dé-

coulent de leur application dans un outil adapté aux municipalités demeurent des défis.

Enfin, les connaissances requises, dans une troisième phase, pour faire des SIG de véritables supports à la décision en sécurité routière sont peu avancées. On peut souhaiter qu'une meilleure compréhension du rapport entre la mobilité, la forme urbaine et la sécurité permettront éventuellement de modéliser et de prédire la performance de différents plans de développement urbain en ce qui concerne la sécurité routière. On peut aussi espérer que la mise au point des systèmes experts facilitera la décision dans des situations de grande incertitude et permettra de réintroduire, dans le processus de conception des interventions, le savoir accumulé grâce à l'évaluation des interventions passées. La recherche en est encore ici à ses premiers

## Première phase

### Reconnaissance du problème et dépistage

- percevoir le problème de la sécurité routière
- identifier les problèmes : quels accidents ? quand ? où ?
- surveiller de façon continue la performance du réseau routier

### Représentation du problème

- lire directement les concentrations d'accidents
- percevoir globalement une information complexe
- appréhender intuitivement les interactions spatiales et les migrations
- mettre en relation les accidents avec différents aspects de l'environnement
- représenter la situation pour fins de sensibilisation et de discussion

## Deuxième phase

### Obstacles

*lacunes dans les données; complexité de l'interprétation des analyses; sous-développement des logiciels simples pour l'évaluation des risques et l'analyse spatiale*

### Évaluation des risques et diagnostic

- améliorer le dépistage en identifiant les risques réels (analyse bayésienne)
- aider à poser un diagnostic par l'étude des patterns d'accidents selon les caractéristiques de l'environnement
- comprendre la distribution spatiale des accidents (interactions spatiales)

### Évaluation des interventions

- tenir compte de la régression vers la moyenne
- tenir compte de la migration des accidents

## Troisième phase

### Obstacles

*sous-développement des connaissances sur le rapport entre la mobilité, la forme urbaine et la sécurité; état de développement des systèmes experts*

### Aide à la prise de décision

- identifier des mesures d'intervention en situation d'incertitude
- intégrer dans la prise de décision les connaissances acquises grâce à l'évaluation
- projeter et simuler les effets des mesures de correction et des plans d'aménagement
- intégrer la sécurité routière comme critère dans les analyses d'impacts
- générer des solutions en CAO

**Figure 5.**  
Les objectifs d'un système d'information géographique en sécurité routière.

balbutiements, les systèmes experts en cours d'élaboration s'adressant aux seuls environnements routiers particuliers qui, comme les intersections, ont fait l'objet d'un grand nombre d'études empiriques (Wu et Heydecker, 1991).

## VERS UNE COORDINATION DE L'EFFORT DE RECHERCHE ET DÉVELOPPEMENT

Les défis posés par l'analyse de l'insécurité et par l'aide à la décision dépassent les ressources de la plupart des municipalités. Sans véritables efforts coordonnés de recherche et développement (R et D), les SIG thématiques adaptés aux petites et moyennes municipalités risquent de demeurer relativement primitifs.

Pour la sécurité routière comme pour d'autres thématiques urbaines, un regroupement des ressources à l'échelle provinciale ou nationale est sans aucun doute souhaitable pour rassembler les connaissances nécessaires à l'exploitation du plein potentiel d'un SIG. Par exemple, un groupe de travail provincial pourrait se pencher sur la qualité des données issues des rapports d'accidents, en particulier celles concernant la localisation des événements, encadrer la conception de systèmes adaptés aux municipalités pour le dépistage et le diagnostic des lieux dangereux, et coordonner l'effort de création d'un savoir valide sur les causes de l'insécurité et l'effet des interventions, en vue de la création de systèmes experts. En supervisant des expériences pilotes jumelant des municipalités, des chercheurs et des consultants, un tel groupe stimulerait l'interaction fructueuse de la pratique et de la recherche pour répondre aux besoins exprimés par le milieu. ❖

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## NOTES

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<sup>2</sup>Ont aussi contribué aux travaux décrits ici madame Ève Deshaies et messieurs Pierre Lemieux, Serge Simard et Michel Veilleux.

<sup>3</sup>Une municipalité qui évalue l'effet d'une intervention sur un point de concentration d'accidents se contente généralement de constater une baisse d'accidents durant la période qui suit l'intervention. Or cette baisse peut parfois s'avérer entièrement explicable par les facteurs mentionnés. Par exemple, la municipalité a souvent choisi un lieu d'intervention à la suite d'une recrudescence d'événements : sans intervention, par simple effet de régression vers la moyenne, on observerait probablement une baisse d'accidents dans les années subséquentes. La baisse observée au point d'intervention peut aussi s'expliquer par une réorganisation de la circulation qui entraîne un déplacement des accidents vers d'autres points du système routier.

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# USING 3-D CAD PERSPECTIVE IMAGES AS EVIDENCE IN PLANNING HEARINGS ... JOHN ALLEY

## RÉSUMÉ

DÉJÀ PRÉSENTÉES COMME PREUVE DANS AU MOINS QUATRE CAUSES EN ONTARIO, LES IMAGES CAO TRIDIMENSIONNELLES SONT EN VOIE DE MODIFIER LA TOURNURE DES AUDIENCES D'URBANISME OÙ L'IMPACT VISUEL EST UN FACTEUR CRUCIAL. LES OUTILS GRAPHIQUES CONVENTIONNELS PEUVENT ÊTRE APPUYÉS PAR DES IMAGES CAO FIABLES (CELLES CRÉÉES PAR UN LOGICIEL RÉPUTÉ ET DÉFENDUES PAR UN TÉMOIN EXPERT QUI PEUT MINIMISER LE BIAIS INHÉRENT À LA TECHNOLOGIE) POUR DONNER PLUS DE CRÉDIBILITÉ À DES CAUSES BIEN FONDÉES TOUCHANT DES QUESTIONS D'URBANISME. POUR UN IMPACT MAXIMAL, IL FAUT ÉVITER LES EFFETS THÉÂTRAUX ET COMPARER LES IMAGES À DES PHOTOGRAPHIES DE SITUATIONS RÉELLES.

Although little has been written on the use of 3-D CAD perspective images as evidence in planning hearings, they have been admitted in at least four Ontario Municipal Board (OMB) hearings.<sup>1</sup> Discussed here are those CAD images that are rendered as solid objects by the computer and produced as video images.<sup>2</sup> In many ways, their use in the hearing process is similar to that of photographs, film and videotapes,<sup>3,4</sup> demonstrative evidence<sup>5</sup> and other technological evidence.<sup>6</sup> The admissibility of CAD images will be based on legal argument and the common-law rules of evidence<sup>7</sup> and will be determined in each case by planning tribunals. The specific issues affecting the admissibility of CAD images as evidence arise from the manner in which they are created and the potential for bias.

3-D CAD images are computer-generated graphical representations (views) of elements defined by point coordinates in a three-dimensional design space. The data elements may exist in true dimensions; however, the model generated by the computer has no scale.

### Data Entry

Data entry can be accomplished in two ways. Operators can type in the coordinates of an element to give it location, length, width and height to an accuracy of 0.1 mm or less using **direct key-in**. Or, they can use **digitized data entry** and trace elements on a drawing with a pointing device, which converts relative positions on the drawing to points on the data model. Less accurate than direct key-in, the degree of accuracy of digitized information — dependent on equipment, operator and scale of material being traced — is usually sufficient for the analysis of planning issues (1:2000 mapping, for example, can be digitized to an accuracy of plus or minus 1 m).

### Generation of Views

The data model in itself is not sufficient to generate a view. Characteristics of each element — such as colour and reflectivity — must be specified to create the effect of different materials. Daylighting is simulated by specifying brightness, contrast and the sun's position. Viewpoints are defined by the coordinates of the view location, the direction of the view and the view angle (or camera lens equivalent). Using this information and applying various mathematical models, the computer calculates what would be visible from the viewpoint and produces the appropriate image.

### POTENTIAL SOURCES OF BIAS

#### Errors in the Data Model

The greatest opportunity for deception in the generation of a 3-D CAD image is during the creation of the data model. Thus, at the very least, the data model must be verified against the three most common errors.

- **Missing features**, such as adjacent structures or major changes in grading, can be found by comparing the computer-generated image against other plans, sections, elevations and photographs of the site.
- **Dimensional errors** can be revealed by examining the dimensions of key elements, such as the property lines, grades and building heights.
- **Inconsistent details** should be apparent if the proposal is more detailed than the surrounding context (which may make it overly attractive).

#### Viewpoint Bias

Single views must be treated with caution. As with photography, some CAD views will show a particular subject to advantage or disadvantage. Providing a number of views (five to 10 are usually sufficient) ensures a more balanced presentation. In evaluating the potential for viewpoint bias, a key plan should be created indicating the viewpoints and the direction of view. This bias can be easily eliminated, however, since any number of additional views can be created quickly and inexpensively once the data model has been created.

#### Lens Bias

Lens or view angle bias is identical to the bias created by using different lenses in photography.<sup>8</sup> To assess lens bias, a key plan should be provided that shows the view angles for each view and states the lens equivalent. Lens bias is most severe when only one image is shown and when lenses with extreme focal lengths (greater than 60 mm and less than 35 mm for a 35-mm camera) are used. With focal lengths of 35 to 60 mm and where comparative views are shown, the viewer can compensate completely for lens bias. For a comparative assessment, CAD images that demonstrate several options — existing, proposed and alternatives — from a single viewpoint can be produced.



Views can be generated with any lens to demonstrate the effect of lens bias.

*Colour and Shading Bias*

When elements in the computer model are assigned colour and shading that do not represent true colours and shades, the view can be biased. Darker shades, brighter colours and higher reflectivities make objects more prominent, while objects appear to recede with lighter shades, muted colours or moderate reflectivities. This bias can be controlled by using material settings that differ only in colour, with shading, intensity and reflectivity remaining constant. If alternatives are shown in comparative views, these same material settings should be used throughout. Any concern about colour or shading bias can be resolved by generating the same view with different colour specifications.

**WHAT CONSTITUTES RELIABLE EVIDENCE?**

*Authentication of Evidence*

The rules of evidence require a witness to verify that a CAD image represents what it purports to represent.<sup>9</sup> In its consideration of a CAD-generated videotape in the 1989 Willmott case, the OMB required "that the professional who developed the program and selected the input data explain what he did, how he did it and why he selected certain inputs, and be cross-examined on it."<sup>10</sup> It is not clear, however, who the OMB wanted to testify: the person who wrote the software or the person who determined the path of motion for the video. Sheppard<sup>11</sup> indicates that evidence can be introduced by an expert "who has by dint of training or practice acquired a good knowledge of the science or art concerning which his opinion is sought and the ability to use his judgement in that art or science."

Using this standard, it would not be necessary to have the software programmer testify as an expert witness since his testimony would not add value to the evidence. Most commercial software is developed by teams, and one programmer could not speak to all aspects of the program. Further, a programmer could not explain why certain inputs were selected or exercise judgement in interpreting specific images. It would be impractical to require the testimony of the programmer, and to do so would unnecessarily limit the use of CAD images. It would also be inconsistent with the use of other computer programs — such as traffic forecasting models — which are often used to produce evidence without the testimony of the programmer.

The best witness to introduce CAD images at a hearing is the planning expert who created the images. It is also acceptable, however, to rely on a planning witness who does not use a CAD system<sup>12</sup> — in much the same way as one can present a photograph without being the photographer — provided the individual understands the principles and limitations of the technology and can take responsibility for creating the images, selecting data and determining settings for materials, colours, shading, viewpoint and lenses.

*Using a Reputable Computer System*

Related to the authentication of evidence is the need to use reliable and recognized software to produce the CAD

images. Although many programs are available, some are better than others. Intergraph Systems and AutoCAD are widely accepted; others should be considered with reference to the standards set by these programs.

*Providing Enduring Evidence*

While original documents are generally required under the "best evidence" rule, "original" CAD images exist as data in a computer, and what constitutes the best evidence is not clear. In the Korgold<sup>14</sup> and Karsturm<sup>15</sup> hearings, a computer was brought into the hearing room to allow full cross-examination of the data model, including all settings and viewpoints. While this was effective, CAD images displayed on a computer screen are transitory. Enduring evidence — in the form of a paper copy of the image — must also be submitted.

*Avoiding Theatrics*

Relevant evidence deemed to have a prejudicial effect that outweighs its factual value can be excluded from a trial.<sup>16</sup> If CAD images presented on a monitor are impressive, videos are even more so, and an overly seductive presentation may prompt a tribunal to exclude evidence or give it less weight. Avoiding theatrics and having the witness discuss the limitations and applicability of the technology before the images are shown help to establish a more credible case. Movies should not be used since they are easily dismissed as special effects and may be considered prejudicial by some tribunals.

*Using CAD Images Appropriately*

Demonstrative evidence must be relevant to the issues at the hearing.<sup>18</sup> CAD images illustrate the potential appearance of a proposal and should only be tendered when the planning case hinges on visual impact and when the images can illustrate the difference — or similarity — between alternatives. Where there is little visual difference between alternatives, CAD images may support a higher level of development. With respect to the Willmott case, by introducing a CAD video to demonstrate the effect of a proposal without including an alternative for comparison, the appellant undermined his own case.<sup>19</sup> In light of the video evidence, the OMB found that the proposed development would be no worse than the surrounding context.

As well, the creation of the data model on which CAD images are based is costly — both in terms of time and money — and the effectiveness of CAD as an analytical and illustrative tool can be undermined if it is used too frequently. Thus, the use of 3-D CAD images in planning hearings should be reserved for the most important and relevant cases.

**MAKING THE MOST OF CAD EVIDENCE**

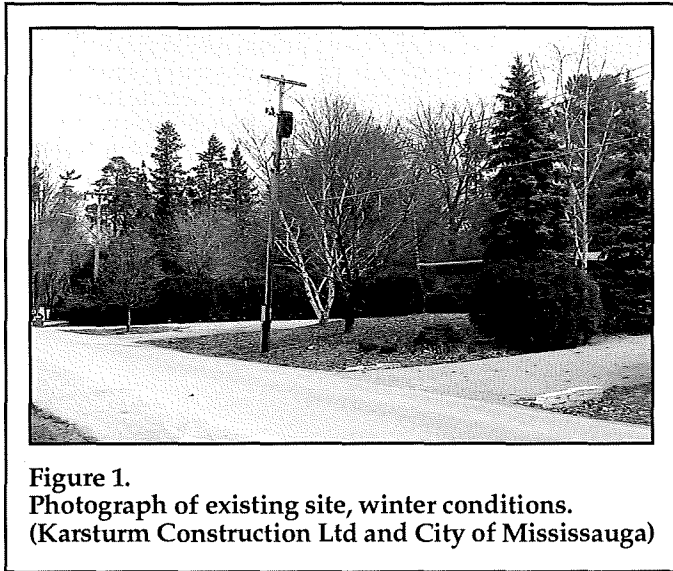
*Images as an Illustration of Expert Opinion*

CAD images only simulate views of a site, and this is something that should be emphasized by the planning expert. They do not represent visual reality because the human eye perceives in a complex manner, which cannot be duplicated. A better approach is to use CAD images to complement conventional graphic tools: as an analytical tool to aid in the development of the expert's opinion and

then as an illustrative tool to visually present that opinion and other relevant findings.

*Comparing Photographs with CAD Perspectives*

The most effective way to show what is represented by CAD images is to compare them to photographs. A photograph taken of the site from a known position with a known lens (Figure 1) can be compared to a CAD image of the model of the existing situation from the same viewpoint with the same lens equivalent (Figure 2). This provides a baseline for interpreting the CAD perspective. With an understanding of how the CAD image relates to a photograph, the viewer has a better grasp of the visual presentation of the proposal based on the CAD images (Figure 3).

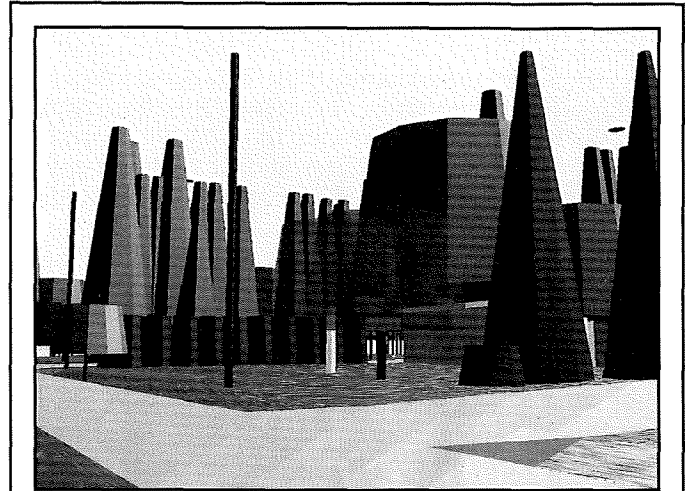


**Figure 1.**  
Photograph of existing site, winter conditions.  
(Karsturm Construction Ltd and City of Mississauga)

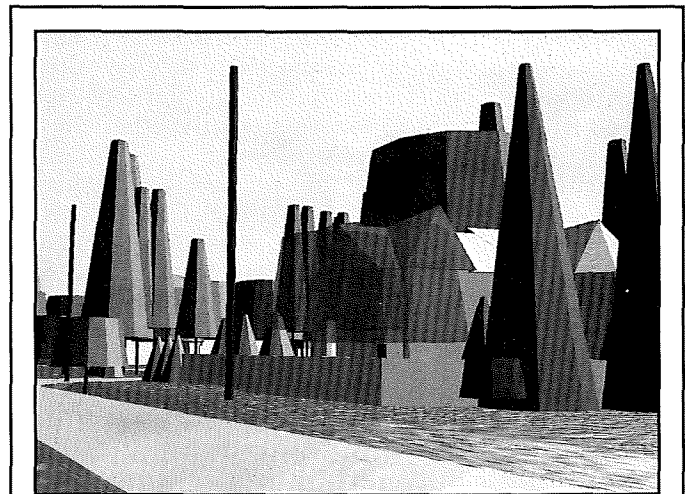
*Ensuring Accuracy*

Under the rules of evidence, instruments that are intended to make measurements are presumed to be accurate.<sup>20</sup> However, CAD systems are not considered to be such instruments. While the perspective views will accurately reflect the data model, the data model cannot be presumed to be accurate — this must be proven. Witnesses presenting CAD images must ensure that the data model is both complete and accurate. Any adjacent features that may affect the visual impact of the proposal must be included, as missing information undermines the strength of the images. In the *Willmott* case, a bridge — which would have been visible in almost every view — was omitted.<sup>21</sup> Although the OMB identified the error and had regard for its effect, the inaccurate images weakened the appellant's case.

The best way to verify data is to bring the software into the hearing room. This allows witnesses to demonstrate the dimensions of any element in the data model and to add elements at the OMB's request. In some cases, the data model and documentation can be made available to all parties to the hearing for independent verification. In time, as the use of CAD images as evidence becomes common practice at planning hearings, verification may consist of the inspection of images and the measurement of hardcopy CAD drawings generated at a known scale.



**Figure 2.**  
CAD image simulating existing site. Trees represent summer conditions. Trees in the centre of the image are transparent to allow for comparison with the photograph shown in Figure 1.



**Figure 3.**  
CAD image simulating proposed development. Existing trees are shown with the exception of those to be removed under the proposed development. New planting is indicated.

*Minimizing and Stating Bias*

The planning witness will be more credible and the CAD images more effective if the limitations of the technology and its potential for bias are voluntarily described: how bias is introduced, detected and minimized. Credibility is further enhanced if the witness has a computer in the hearing room and is prepared to generate new views or alter the focal length, colouring or shading at the request of the OMB. Simply making the system accessible indicates the witness has confidence in the fairness of the presentation.

A planner presenting fair and unbiased images will be virtually immune to cross-examination. Opposition lawyer-

ers are taught not to ask questions if they do not know the answers, and thus they will be reluctant to request new views for fear of undermining their own case and confirming the planner's credibility. Because of this, the opposing side may request an opportunity to verify the accuracy of the data model and views in advance of the hearing. Such a request should be granted, particularly if it could encourage a pre-hearing settlement.

*Conveying the Limitations*

Computer images are abstractions and lack the detail that gives them photographic accuracy.<sup>22</sup> This lack of detail may make it difficult for inexperienced viewers to understand what is being shown. It may also make depth and scale difficult to judge unless sufficient contextual elements (people and trees) are included. The planning witness must assist in the interpretation of the images by describing what is being shown. Where architectural detail is beyond the mandate of planning controls, the limitations of CAD technology can be used to advantage by eliminating the potential for prejudice created when there is too much detail.

**T**he use of 3-D CAD perspective images as evidence at planning hearings is a relatively new practice and one that is particularly relevant where the visual impact of a proposal is at issue. It is not an ace in the hole, however, and cannot be expected to save a weak case. In combination with other traditional graphic tools, it can be used effectively to support a strong case, especially one that hinges on visual presentation.

Because they lead to improved decision-making by clarifying the visual aspects of a proposal, CAD images are a welcome addition to the hearing process. This technology will be of even greater value when its strengths and limitations are more widely understood and when it is used selectively and responsibly. Although the concepts presented here should serve as a guide to the use of CAD imagery in planning hearings, each case will turn on its own unique factors. Whenever it is applied as evidence in the hearing process, however, CAD technology should be used to clearly and accurately convey information in the promotion of sound and effective planning. ♦

JOHN ALLEY IS AN URBAN DESIGNER WITH THE CITY OF MISSISSAUGA AND HAS USED CAD IMAGES IN TWO ONTARIO MUNICIPAL BOARD HEARINGS.

**REFERENCES**

<sup>1</sup>"Re Willmott and City of North York," 23 OMBR, 33 (1989); "Karsturm Construction Ltd and City of Mississauga," OMB files M-900097, O-910059, Z-900144, unreported OMB Decision April 16, 1993. Mentioned in passing in "Re Smye Homes Ltd," 6 MPLR (2d), 251 and "Korgold Development Corporation and City of Mississauga *et al.*," OMB files Z-900243, S-900243, S-900077, O-910130, unreported OMB decision November 18, 1992.

<sup>2</sup>Use of CAD-generated outlines (wire-frame line drawings) as the base for artist's conceptions is not considered here, although some of the issues discussed may apply.

<sup>3</sup>Fraser, Hon. Mr. Justice G.P. "Admissibility of Photographic, Film, and Videotape Evidence," *The Advocate*, 50, 1992: 19-31.

<sup>4</sup>Goldstein, E. "Videotapes, Films, and Photographs: Rules of Civil Procedure," *The Advocates Society Journal*, 7 (3), June 1988: 3-14, 38.

<sup>5</sup>Morse, J.R., and Bowers, G. "Use of Demonstrative Evidence During Trial," *Canadian Journal of Insurance Law*, 7 (5) May 1989: 72-76.

<sup>6</sup>Sheppard, A.F. "Admissibility and Technology," *The Advocate*, 47, 1989: 741-750.

<sup>7</sup>The rules of evidence require that demonstrative evidence be relevant to the issues at the hearing (Sheppard, p. 744; Goldstein, p. 3; Morse and Bowers, p. 72), be authenticated (Fraser, pp. 22-24; Morse and Bowers, p. 3) and be the best evidence available (Sheppard, p. 747; Fraser, p. 26). The evidence should not mislead or prejudice the tribunal but should assist in proving the facts of the case (Fraser, pp. 24-25; Morse and Bowers, pp. 72-73; Goldstein, p. 3).

<sup>8</sup>'Normal' lenses (45-55 mm focal length for cameras using 35 mm film) make objects appear realistic in size relative to the context, but show less of that context than a person would perceive. 'Wide angle' lenses (less than 45 mm focal length) make objects appear smaller than perceived by the human eye, but capture a more realistic field of view. 'Telephoto' lenses (focal lengths of 55 mm or greater) make objects appear larger relative to the context than perceived by the human eye and capture a narrow field of view like a person's cone of focussed vision, but do not capture the context a person would see in her peripheral vision. A moderate wide angle lens (35-45 mm) is often appropriate to capture a realistic peripheral view without excessive distortion.

<sup>9</sup>Morse and Bowers, p. 72.

<sup>10</sup>"Re Willmott and City of North York," 23 OMBR, 33 (1989).

<sup>11</sup>Sheppard, p. 744.

<sup>12</sup>Where the planner is not proficient with the CAD system, it will also be necessary to have the CAD technologist as a witness to discuss any technical matters.

<sup>13</sup>Images created by programs that rely on inserting scaled photographic images like a cut-and-paste operation should not be admitted as evidence.

<sup>14</sup>"Korgold Development Corporation and City of Mississauga *et al.*," OMB files Z-900243, S-900077, O-910130, unreported OMB decision November 18, 1992.

<sup>15</sup>"Karsturm Construction Ltd and City of Mississauga," OMB files M-900097, O-910059, Z-900144, unreported OMB decision April 16, 1993.

<sup>16</sup>Fraser, pp. 24-25; Morse and Bowers, pp. 72-73.

<sup>17</sup>"Willmott and City of North York," p. 36.

<sup>18</sup>Morse and Bowers, p. 72; Fraser, p. 21; Sheppard, p. 744.

<sup>19</sup>"Willmott and City of North York," pp. 36-38.

<sup>20</sup>Sheppard, p. 747.

<sup>21</sup>"Willmott and City of North York," p. 38.

<sup>22</sup>It is possible to generate CAD views that are almost photographic, but they require exponentially greater time, data and computer power.

<sup>23</sup>"Karsturm Construction Ltd and City of Mississauga," p. 31.



# Stock Market Timing

"Buy and hold" – this is probably the most common strategy advice mutual funds investors receive. How many times have you seen ads which claim "If you had invested \$10,000 in 1955, your investment would be worth \$2,000,000 today"?

Hard to argue with, isn't it? Especially since equity mutual funds have been known to outperform many other investments over the long term.

Most mutual fund investors are content to leave their investment decisions to the professionals who manage the funds. They feel fund managers have the expertise and temperament to juggle a portfolio, dropping over-priced stocks while adding those which have greater growth potential.

However, some investors would like to try timing the market themselves.

"Beating the market" takes a lot of work and, some say, innate knowledge, a feel for when the market will rise or fall. It's not easy. Even experts will admit their failures in market timing, especially those swamped by the October 1987 stock market crash.

The amateur investor will have little time to monitor the normal factors that affect the market, let alone the unpredictable and unusual situations that can send a market soaring or into a freefall. The professional fund manager, however, watches the market full-time, evaluating such trends as consumer confidence levels, house-building activity and corporate profitability, along with economic indicators, such as interest rates and retail spending.

All of these factors can contribute to a market's performance. Many professionals believe that bull (rising) and bear (falling) markets precede turns in the economy on an average of 11 months. Therefore, the investor will have to be able to look for more than one year into the future without the help of a crystal ball.

The challenge in trying to guess the market's direction is that the investor has to be right both times, knowing when to get out and when to get back in.

To alleviate potential errors, the investor may decide to trade only part of their funds or those invested in specialty funds that have a tendency to be volatile. These could include energy, gold and foreign mutual funds.

Overall, the "buy-and-hold" strategy is a sound idea for many investors. But "buy-and-hold" does not mean "sit back and coast". Investors should monitor their funds closely to ensure the fund is performing consistently. Watch

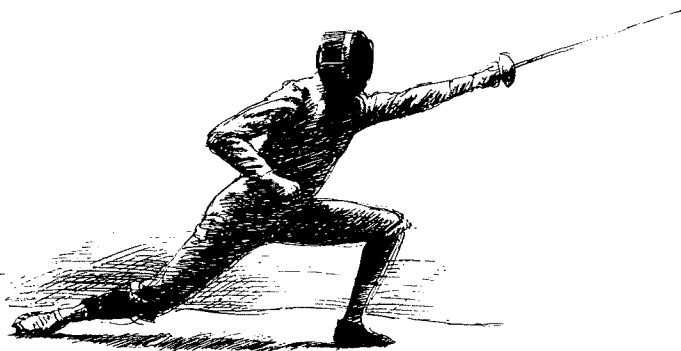
for any changes in a fund's management and management policy. For example, if management changes could adversely effect a fund's performance, you might want to consider switching funds.

Also, many investors will want to change the type of funds they hold as their needs change. As they get older and are less willing to take risks, investors will likely want to shift away from aggressive growth funds to more conservative balanced or income funds.

With mutual funds, investors can reap the benefits of owning stocks while avoiding the risks and costs involved in dealing directly with the market. For avid stock market watchers, a mutual fund's portfolio can be monitored from the newspapers' business pages as well as through the fund company's updates and literature.

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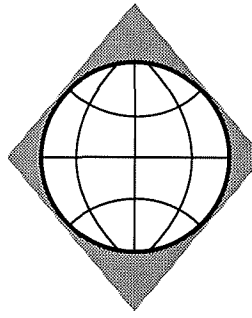
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# MANCHETTES

UN CONDENSÉ DES NOUVELLES  
EN URBANISME

## A Land Use Policy for the Halifax Public Gardens?

Andrew Paton, MCIP

The Province of Nova Scotia recently began a formal process to adopt a provincial land use policy for the Halifax Public Gardens Precinct. The proposed policy applies to an area of about one block in all directions surrounding the Halifax Public Gardens.

The Public Gardens — as it is often called — is over 120 years old and occupies an entire block in the heart of Halifax. It abuts Spring Garden Road, one of the city's prime retail streets, and is adjacent to the Halifax Citadel Historic Site. Itself a national historic site, the Public Gardens is one of the few surviving rare Victorian gardens in Canada.

The area surrounding the Public Gardens has been subject in recent years to several high-rise developments. This has led to concerns by citizens' groups such as the Friends of the Public Gardens and Heritage Trust that the gardens could be overwhelmed by this type of development — and thereby compromise people's ability to enjoy them.

In response to these concerns, the Province, led by the Department of Tourism and Culture, enacted *An Act to Protect the Halifax Public Gardens*. This legislation had two objectives:

- to protect the area surrounding the gardens from development that is incompatible with its character;

- to protect the gardens for an interim period to enable the Province to develop a provincial land use policy for the protected area (the interim protection provided by the Act just expired).

As a result of that legislation, the Department of Tourism and Culture and the Department of Municipal Affairs drafted a proposed provincial land use policy. In February of this year, Cabinet gave formal notice of its intention to adopt a provincial land use policy for the Public Gardens.



The objective of the proposed policy is to establish height limits and influence the form of development within the public gardens precinct. It proposes that design guidelines be adopted so that development in the precinct complements both the garden's character and the area's pedestrian nature.

This is the first time the Province of Nova Scotia has proposed the adoption of a provincial land use policy under its 1983 *Planning Act*. Four other provinces — Manitoba, Ontario, Prince Edward Island and Saskatchewan — also have planning legislation that enables the adoption of a provincial land use policy.

In Nova Scotia, the process for such adoption — as required by the *Planning Act* — is more involved than in the other provinces. The Act requires the Province to give formal notice to an affected municipality and the

## Une politique en matière d'occupation du sol pour les jardins publics d'Halifax ?

Andrew Paton, MICU

Récemment, la Nouvelle-Écosse amorçait un processus officiel en vue d'adopter une politique provinciale en matière d'occupation du sol dans le secteur des jardins publics d'Halifax. La politique proposée s'appliquerait à un secteur couvrant environ un pâté de maisons dans toutes les directions autour des jardins publics d'Halifax.

Les jardins publics ont plus de 120 ans et occupent environ un pâté de maisons au coeur d'Halifax. Ils sont contigus à la rue Spring Garden, l'une des principales artères commerciales de la ville, et adjacents au site historique de la citadelle d'Halifax. Ils ont aussi été désignés «lieu historique national» et sont l'un des rares jardins victoriens à survivre au Canada.

Ces dernières années, on a construit plusieurs gratte-ciel dans le secteur entourant les jardins publics. Cette situation a suscité chez des groupes de citoyens, notamment le Friends of the Public Gardens et le Heritage Trust, la crainte que les jardins pourraient être envahis par ce type de construction, et, de ce fait, que les gens risqueraient de ne plus pouvoir en profiter.

En réponse à ces préoccupations, la province, incitée par le ministère du Tourisme et de la Culture, a promulgué la *Loi visant à protéger les jardins publics d'Halifax*. Cette Loi visait deux objectifs :

- protéger le secteur entourant les jardins contre des projets d'aménagement incompatibles avec son aspect; et
- protéger les jardins pendant une période provisoire afin

de permettre à la province d'élaborer une politique provinciale en matière d'occupation du sol dans le secteur préservé (la protection provisoire assurée par la Loi vient de prendre fin).

Après l'adoption de cette loi, le ministère du Tourisme et de la Culture et celui des Affaires municipales ont élaboré une politique provinciale provisoire en matière d'occupation du sol. En février de cette année, le Cabinet a publié un avis officiel indiquant son intention d'adopter une politique provinciale en matière d'occupation du sol pour les jardins publics.

La politique proposée vise à fixer des limites de hauteur et à influencer la forme des projets d'aménagement dans le secteur des jardins publics. Il propose l'adoption de lignes directrices en matière de conception afin que les projets d'aménagement dans ce secteur se marient à l'aspect des jardins et au caractère piétonnier du secteur.

C'est la première fois que la Nouvelle-Écosse propose l'adoption d'une politique provinciale en matière d'occupation du sol en vertu de la *Loi de 1983 sur l'aménagement du territoire*. Quatre autres provinces, soit le Manitoba, l'Ontario, l'Île-du-Prince-Édouard et la Saskatchewan, ont également des lois sur l'aménagement du territoire qui permettent l'adoption d'une politique provinciale en matière d'occupation du sol.

En Nouvelle-Écosse, conformément à la *Loi sur l'aménagement du territoire*, le processus requis pour adopter ce genre de politique est plus complexe que dans les autres provinces. La Loi exige que la province avise officiellement une municipalité touchée et la population au moyen d'annonces dans les journaux de son intention d'adopter la politique; qu'elle accorde un délai d'au moins 60 jours pour les soumissions relatives à la proposition; et qu'elle

general public (newspaper advertisement) of its intent to adopt the policy; to provide an opportunity, of not less than 60 days, for submissions on the proposal; and to hold a public meeting if the affected municipality so requests.

As in most other jurisdictions, where a provincial land use policy is adopted, local planning documents must be consistent with such a policy. If the

policy for the Halifax Public Gardens Precinct is adopted, the City of Halifax will be required to amend its municipal planning strategy and land use by-law. ❖

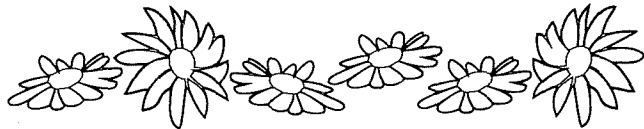
ANDREW PATON IS A PLANNER IN THE PROVINCIAL PLANNING SECTION, COMMUNITY PLANNING DIVISION OF THE NOVA SCOTIA DEPARTMENT OF MUNICIPAL AFFAIRS; (902) 424-7492.

tienne une réunion publique si la municipalité touchée le demande.

Comme dans la plupart des autres sphères de compétences, lorsqu'on adopte une politique provinciale en matière d'occupation du sol, cette dernière doit être compatible avec les documents d'urbanisme locaux. Dans l'éventualité où la politique touchant le secteur des jardins publics d'Halifax est

adoptée, la Ville d'Halifax devra modifier sa stratégie municipale en matière d'urbanisme et son règlement régissant l'occupation du sol. ❖

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**World HABITAT Day 1993**  
**WOMEN AND SHELTER DEVELOPMENT**

The theme "Women and Shelter Development" has been chosen as the focus of this year's *World HABITAT Day* observance on October 4. Women in most societies are the invisible work force. Their knowledge and expertise is often ignored by those responsible for making decisions on settlement policies. This year's *World HABITAT Day*'s theme offers the opportunity to recognize women as active participants in human settlements development. It also underscores support for grassroots participation of women in human settlements planning, program formulation, implementation, management and maintenance efforts.

In many cases, women in urban informal settlements and in remote areas are the ones who gather materials to build the family shelter; who turn a shelter into a home for the entire family. Safe and sound shelter, sanitation, clean water and facilities for waste disposal are immediate concerns for poor women, who directly face adverse consequences of the absence of such facilities and services.

UNCHS (Habitat) is focussing its program and activities on women, particularly those struggling to survive in the subsistence economy. A process has been initiated to involve women at all levels of formulation and implementation of human settlements policies and programs. This means improving women's access to credit for both property ownership and business development; protecting and improving women's shelter and land tenure; opening up employment opportunities for women at all levels in the field of human settlements (management, planning, financing, maintenance, construction); and improving the living and working environment of women — especially those with low incomes — their families and their communities.

Equality for women, economic growth and development are inseparable. Accordingly, the struggle to reduce poverty, the search for sustainable development and the initiatives of communities and local governments will all be enhanced by the active participation of women. ❖

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**Journée mondiale de l'HABITAT 1993**  
**LES FEMMES ET LE DÉVELOPPEMENT DU LOGEMENT**

Cette année, la *Journée mondiale de l'HABITAT*, qui aura lieu le 4 octobre, aura pour thème «Les femmes et le développement du logement». Dans la plupart des sociétés, les femmes constituent la main-d'oeuvre invisible. Trop souvent, les décideurs chargés d'élaborer les politiques relatives aux établissements ne tiennent pas compte de leurs connaissances et de leur compétence. Le thème de la Journée mondiale de l'HABITAT pour cette année permet de reconnaître les femmes comme des participantes actives au développement des établissements humains. Il souligne également le rôle des femmes dans la planification des établissements humains, la conception des programmes, la mise en oeuvre, la gestion et l'entretien.

Souvent, dans les établissements urbains de fortune et les régions éloignées, ce sont les femmes qui rassemblent les matériaux pour construire l'abri familial et en faire un chez-soi pour toute la famille. Les femmes pauvres sont directement préoccupées par l'accès à un abri sain et sûr, à un système sanitaire, à de l'eau propre et à des installations pour éliminer les déchets, car ce sont elles qui subissent directement les conséquences défavorables de l'absence de ces installations et de ces services.

Le CNUEH (Habitat) axe son programme et ses activités sur les femmes, particulièrement sur celles qui luttent pour survivre dans une économie de subsistance. Nous avons établi un processus visant à faire participer les femmes à tous les niveaux de l'élaboration et de la mise en oeuvre des politiques et des programmes touchant les établissements humains. Ce processus consiste à leur faciliter l'accès au crédit pour leur permettre d'accéder à la propriété et de contribuer à la mise sur pied d'entreprises; à protéger et à améliorer les logements et les modes d'occupation pour les femmes; à leur offrir des perspectives d'emploi à tous les niveaux dans le domaine des établissements humains (gestion, planification, financement, entretien et construction); et à améliorer le milieu de vie et de travail des femmes, surtout de celles à faible revenu, de leur famille et de leur collectivité.

L'égalité pour les femmes, la croissance économique et le développement sont indissociables. Ainsi, la lutte en vue de réduire la pauvreté, la recherche d'un développement viable et les initiatives des collectivités et des gouvernements locaux seront toutes améliorées grâce à une participation active des femmes. ❖

POUR DE PLUS AMPLES RENSEIGNEMENTS, VEUILLEZ COMMUNIQUER AVEC SELMAN ERGUDEN, CHEF, CNUEH, BUREAU D'OTTAWA, 130, RUE ALBERT, PIÈCE 417, OTTAWA (ONTARIO) K1P 5G4.

## FAMICITY 2000: Cities for Families

Yvon Valcin

The purpose of *FAMICITY 2000* is to develop a policy that will help cities integrate "the family" efficiently and irreversibly into their political, administrative and organizational culture by the year 2000. The goal is the creation of *FAMICITIES* — attractive, healthy, friendly and safe living environments for families.

The major concept behind this policy and the organizational approach proposed for its implementation is "URBANISSIMA." First applied by the City of Hull as part of its family policy, *URBANISSIMA* proposes a new vision of municipalities based on the family — without neglecting non-family households or trying to dictate happiness — an inherent family responsibility.

Basically, *URBANISSIMA* establishes a link between the family and planning, and provides cities with an approach to implement their family policy. This means integrating the family policy with urban development. Although cities are communities of citizens — by definition, tradition or politi-

cal and organizational structure — the vast majority of the urban population (72 percent in Canada and 71 percent in Quebec) is comprised of family households.

*URBANISSIMA* and the transformation from city to *FAMICITY* requires a reorientation of the political vision and the administrative structure. It also means a new focus — one that is not restricted to citizens as individuals and considers the diverse needs and nature of the family unit. Municipal services must be geared toward the family, and the city's urban development plan considered from a family perspective.

In short, *URBANISSIMA* involves a redefinition of the city as an organizational entity and service provider, and this has an impact on planning as a discipline and a practice. In the winter 1993 edition of *URBO-INFO*, the Association des urbanistes et des aménagistes municipaux du Québec (AUAMQ) urged its members to "focus on this new concept, try to develop and improve it, based on the experience of municipal planners." ❖

FOR MORE INFORMATION, CONTACT YVON VALCIN, *FAMICITY 2000*, CITY OF HULL, MAISON DU CITOYEN, 25 LAURIER AVENUE, 7TH FLOOR, HULL, QUEBEC J8X 4C8; (819) 595-7137.

## FAMICITÉ 2000 : Une ville pour ma famille !

Yvon Valcin

Le but du projet *FAMICITÉ 2000* est de fournir aux villes une politique-cadre visant à introduire de manière efficace et irréversible la Famille dans leur culture politique, administrative et organisationnelle pour transformer chacune d'elles d'ici l'an 2000 en une *FAMICITÉ*, un milieu de vie intéressant, sain, accueillant et sécuritaire pour les familles qui l'habitent.

*URBANISSIMA* est le concept-moteur qui anime l'ensemble de cette politique-cadre et la démarche organisationnelle proposée pour la mettre en application. Appliquée une première fois à la politique familiale de la Ville de Hull, *URBANISSIMA* propose une vision nouvelle de la chose municipale, axée sur les familles et non plus uniquement sur les citoyens et les citoyennes, sans négliger pour autant les ménages non familiaux, ni municipaliser le bonheur familial, qui est d'abord de la responsabilité des familles elles-mêmes.

Essentiellement, *URBANISSIMA* propose aux villes une vision urbanistique de la famille

en même temps qu'une vision familiale de l'urbanisme, comme instrument d'intervention dont dispose la ville pour la mise en application de la politique familiale. Cela revient à intégrer la politique familiale au plan d'urbanisme. Cette vision familiale ou encore familiste de l'urbanisme est elle-même fondée sur le fait que, même si la ville est, par définition, tradition ou encore de par sa culture politique et organisationnelle, une collectivité de citoyens et citoyennes, la très grande majorité de la population urbaine est constituée de ménages familiaux — dans une proportion de 72 pour cent au Canada et de 71 pour cent au Québec.

La nouvelle dynamique qu'*URBANISSIMA* mettra en jeu pour que la ville devienne une *FAMICITÉ* et puisse répondre adéquatement aux besoins de toutes les familles qui l'habitent exige un recadrage et un réalignement de la vision politique et de la structure administrative vers les familles et non uniquement vers des citoyens et des citoyennes. Par conséquent, elle commandera une réorientation des services municipaux vers les familles, de même qu'une réinterprétation du plan d'urbanisme de la ville dans une optique familiale.

En bref, *URBANISSIMA* est une redéfinition de la ville comme entité organisationnelle pourvoyeuse de services en même temps qu'une réorientation familiale imprimée à l'urbanisme comme discipline et comme pratique. Il n'est donc pas surprenant que, dans l'édition d'hiver 1993 d'*URBO-INFO*, l'Association des urbanistes et des aménagistes municipaux du Québec (AUAMQ) invite fortement ses membres à «aiguiller l'attention sur ce nouveau concept, à tenter de le développer et de le bonifier à la lumière de l'expérience des urbanistes municipaux». ❖

POUR INFORMATION : YVON VALCIN, CONCEPTEUR, *FAMICITÉ 2000*, VILLE DE HULL, MAISON DU CITOYEN, 25, RUE LAURIER, 7<sup>e</sup> ÉTAGE, HULL (QUÉBEC) J8X 4C8; (819) 595-7137.

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## Municipal Regulatory Process and Home Businesses

Barbara Orser and Mary Foster

While planning issues and urban form are not often a focus of study within the small business literature, land use management does play a pivotal role by permitting or prohibiting the type of home-based businesses through by-laws that regulate the activities and performance of these businesses. The attitudes of municipal officials have a significant impact on the support and legislative endorsement of home business. This article summarizes the findings from a case study of 22 Canadian municipalities and survey of 404 home businesses regarding the regulation and land use management practices of home-based businesses.

### Models of Economic Development

The emergence of micro business and home-based enterprise as a major factor in Canadian employment challenges the traditional top-down economic development model. The bottom-up model of development may be referred to within the urban development context as "sustainable" community development. Sustainable implies less dependence on resources and supplies where price is uncertain and community designs are targeted to self-reliance and the use of local resources. On the other hand, the top-down development model, which focusses on large corporate management, is supported by traditional schools of economic and planning theory. These schools of thought maintain that work and labour are transacted in the workplace while the home remains a sanctuary for private and family activity. Consequently, family and household activity are segregated into low- and medium-density residential zones while paid labour is removed to commercially-zoned and industrial parks.

The bottom-up model of growth is based on small and

medium enterprise development. Small indigenous business is thought to fuel community growth within a sustainable/small business context. Home-based business is a subset of the small and micro business community.

### The Conflict of Theory and Policy

The traditional response to economic development under federal and regional development policies favours a top-down model. Large branch plant operations are enticed into established industrial parks and serviced land through tax discounts on land, sewage and water and in some cases tax holidays, and many communities attempt to attract clean large industry in an effort to become self-sufficient.

**"More research is needed to understand how tax policy, urban design/form and building codes create deterrents and obstacles to home-based business development."**



The attitude of municipal officials to a bottom-up or sustainable community development concept significantly affects planning regulations regarding home enterprise. Top- rather than bottom-up development and negative attitudes or at best neutral concern for home business among city officials typically reflect the interest these businesses are given by the development community.

### Study Findings

Municipal interest in home-based business is at best neutral. Officers and administrators had conflicting perspectives on their role and responsibility of regulating home work. Several policy analysts and planners

## Règlements municipaux et entreprises à domicile

Barbara Orser et Mary Foster

Les questions relatives à l'urbanisme et à la forme urbaine sont rarement mentionnées dans la documentation sur les petites entreprises, mais la gestion de l'occupation du sol joue un rôle crucial en permettant ou en interdisant certains types d'entreprises à domicile au moyen de règlements régissant leurs activités. L'attitude des responsables municipaux a une incidence majeure sur l'adoption de lois autorisant les entreprises à domicile. Cet article résume les conclusions d'une étude de cas de vingt-deux municipalités canadiennes et d'une enquête réalisée auprès de 404 entreprises à domicile concernant la réglementation et les méthodes de gestion d'occupation du sol touchant ce genre d'entreprises.

### Modèles de développement économique

L'émergence de micro-entreprises et d'entreprises à domicile sur la scène canadienne de l'emploi remet en question le modèle conventionnel de développement économique descendant. Dans le contexte du développement urbain, le modèle de développement ascendant est considéré comme un développement «viable». La viabilité sous-tend une dépendance moindre à l'endroit des ressources et des approvisionnements lorsque les prix fluctuent et que le design urbain vise l'autosuffisance et l'utilisation de ressources locales. Par contre, le modèle de développement descendant, qui est axé sur la gestion des grandes sociétés, bénéficie de l'appui des écoles de théories économiques et urbanistiques conventionnelles. Ces écoles de pensée soutiennent que le travail doit se faire sur le lieu de travail, tandis que la résidence demeure un sanctuaire pour les activités privées et familiales. Ainsi, les activités familiales sont reléguées aux zones résidentielles à faible et

moyenne densités, tandis que le travail rémunéré se fait dans les secteurs commerciaux et les parcs industriels.

Par contre, le modèle de croissance ascendant est fondé sur la création de petites et moyennes entreprises. On considère que les petites entreprises locales favorisent la croissance en procurant un cadre viable. Les entreprises à domicile sont un sous-produit des petites et des micro-entreprises.

### Le conflit entre la théorie et les politiques

Les méthodes conventionnelles de développement économique préconisées dans les politiques de développement fédérales et régionales favorisent le modèle descendant. On encourage les grandes sociétés à implanter une usine dans les parcs industriels établis et sur des terrains viabilisés en leur offrant des remises fiscales sur les terrains, les égouts et l'aqueduc, et, dans certains cas, des exonérations temporaires de taxes. Beaucoup de collectivités cherchent à attirer de grandes industries non polluantes afin de devenir autosuffisantes.

L'attitude des responsables municipaux à l'égard du concept de développement ascendant ou viable a une incidence importante sur les règlements d'urbanisme qui régissent les entreprises à domicile. Le développement descendant plutôt qu'ascendant et l'attitude négative ou, tout au mieux, la neutralité des responsables municipaux à l'égard des entreprises à domicile reflètent généralement l'intérêt que les intervenants du secteur de l'aménagement accordent à ces entreprises.

### Conclusions de l'étude

L'intérêt des municipalités à l'endroit des entreprises à domicile est, tout au mieux, caractérisé par la neutralité. Les responsables et les administrateurs municipaux ont des points de vue conflictuels quant à leur rôle et à leurs responsabilités dans la réglementation du travail à domicile. Plusieurs analystes et urbanistes considèrent que la réglementation des entreprises à



view home enterprise as a policy issue rather than a site application decision. This position maintains that home business permits and by-laws approval are a land use concern only.

Municipalities generally operate from a complaint perspective, being most aware of the nuisance businesses due to public complaints or "problem" businesses (auto repair, landscape and construction). Planning regulations must consider potential changes or the detrimental effect on residential neighbourhoods (increased traffic and congestion; noise, heat and outside storage; overburdening of public services).

Because most municipal officials do not consider home-based business as part of the community's economic fabric, none of the surveyed communities actively facilitate home-based enterprise.

Complaints are generally dealt with on an ad hoc basis. Communities must better understand the nature of complaint and concerns about home enterprise within the commercial, residential and home work communities. Elected officers and senior planning officials can encourage innovation and micro-business development by challenging the norm that these businesses are fringe nuisances.

No mechanism exists within the municipal regulatory system to objectively evaluate the "process" of by-law development and permit application assessment. Labour force monitoring instruments (Canadian Labour Force Survey and Census) miss the home work sector, and therefore the by-laws and building codes "catch" the home-based business by default.

### Recommandations

- *Create Municipal Awareness:* Information about the contribution of home-based businesses to local economies would inform municipal officials of the benefits of bottom-up economic development. An information package might include empirical findings, case studies and model by-laws of pro-active communities.

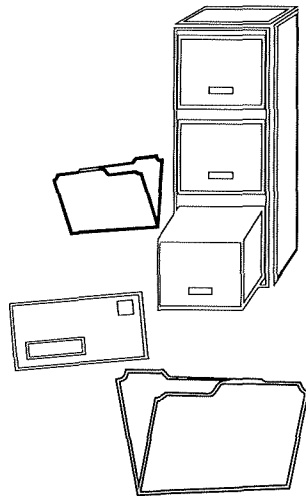
- *Know the Market:* Councils must be better acquainted with the home-based business community in order to make decisions about permit/program development and resource allocation.

- *Monitor Complaints:* Municipalities must develop an ongoing data bank containing information on home business applications, permits and complaints. This information bank can be assessed to review trends, performance for development or business licence renewal.

- *Understand the Needs of Home Businesses:* More research is needed to understand how provincial and federal tax policy, urban design/form and building codes create deterrents and obstacles to home-based business development.

At the municipal level, consideration should be given to testing specific business development and support services: one-stop permit process; fast-track permits for established businesses; an industrial registrar to allow community networking; and financial or tax inducements for business development. ♦

BARBARA ORSER AND MARY FOSTER ARE WITH THE SCHOOL OF BUSINESS MANAGEMENT, FACULTY OF BUSINESS AT RYERSON POLYTECHNICAL INSTITUTE IN TORONTO; (416) 481-0992. THE STUDY WAS SUPPORTED BY THE NATIONAL HOME-BASED BUSINESS PROJECT COMMITTEE.



domicile relève plutôt des politiques que de l'approbation des demandes d'aménagement. Ce point de vue suppose que l'approbation des permis et des règlements pour les entreprises à domicile est strictement une question d'occupation du sol.

En général, les municipalités vont plutôt réagir aux plaintes. Elles sont plus conscientes des entreprises considérées nuisibles ou «à problèmes» selon les plaintes formulées par la population (réparation d'automobiles, aménagement paysager et construction). Les règlements d'urbanisme doivent tenir compte des changements éventuels ou des effets négatifs sur les quartiers résidentiels (hausse et engorgement de la circulation; bruit, chaleur et entreposage extérieur; surcharge des services publics).

Puisque la plupart des responsables municipaux ne considèrent pas les entreprises à domicile comme un élément du tissu économique de la collectivité, aucune des collectivités qui ont participé à l'enquête n'appuie activement les entreprises à domicile.

On règle généralement les plaintes de façon individuelle. Les collectivités doivent mieux comprendre la nature des plaintes et des préoccupations concernant les entreprises à domicile en tenant compte du point de vue des commerçants, des résidents et de ceux qui travaillent à domicile. Les élus et les cadres supérieurs de l'urbanisme peuvent encourager l'innovation et le développement des micro-entreprises en modifiant la perception voulant que ces entreprises sont des nuisances marginales.

Il n'existe aucun mécanisme dans le système réglementaire municipal pour évaluer objectivement le «processus» d'élaboration des règlements et d'évaluation des demandes de permis. Les outils de contrôle de la main-d'oeuvre (enquête sur la population active du Canada et recensement) ne touchent pas le secteur du travail à domicile et, par conséquent, les règlements et les codes du bâtiment «captent» les entreprises à domicile par défaut.

### Recommandations

- *Sensibiliser les municipalités:* Une trousse d'information décrivant la contribution des entreprises à domicile aux économies locales sensibiliserait les responsables municipaux aux avantages du développement économique ascendant. Cette trousse pourrait renfermer des données empiriques, des études de cas et des règlements modèles de collectivités proactives.

- *Connaître le marché:* Les conseils municipaux doivent mieux connaître les entreprises à domicile afin de prendre des décisions touchant les permis, l'élaboration des programmes et l'affectation des ressources.

- *Contrôler les plaintes:* Les municipalités doivent établir une banque de données permanente renfermant de l'information sur les demandes, les permis et les plaintes concernant les entreprises à domicile. Cette banque de données peut servir à déterminer les tendances et les perspectives de développement ou au renouvellement des permis commerciaux.

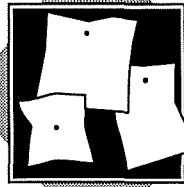
- *Comprendre les besoins des entreprises à domicile:* Il faut effectuer plus de recherches pour comprendre comment les politiques fiscales provinciales et fédérales, les formes et le design urbains et les codes du bâtiment créent des obstacles et découragent le développement des entreprises à domicile.

À l'échelle municipale, il faut accorder une attention particulière aux services de soutien et de développement des entreprises : un comptoir unique pour les permis; le suivi rapide des permis pour les entreprises établies; un registre industriel pour permettre l'établissement de réseaux communautaires; et des encouragements financiers ou fiscaux pour le développement des entreprises. ♦

BARBARA ORSER ET MARY FOSTER TRAVAILLENT À LA SCHOOL OF BUSINESS MANAGEMENT, FACULTY OF BUSINESS, RYERSON POLYTECHNICAL INSTITUTE, À TORONTO; (416) 481-0992. CETTE ÉTUDE A BÉNÉFICIÉ DE L'APPUI DU COMITÉ NATIONAL DES ENTREPRISES À DOMICILE.

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ANNOUNCEMENTS AND NEWS  
FROM THE INSTITUTE



# BABILLARD

ANNONCES ET NOUVELLES DE  
L'INSTITUT

## Proposed Statement of Ethical Values and Code of Professional Conduct

A revised version of a proposed *Statement of Ethical Values and Code of Professional Conduct*, distributed to you in June, incorporates comments we received following the circulation of a first draft to affiliates and universities in the fall of 1992. Please read and discuss this version with your colleagues. Your comments can be provided directly to the Institute or through your affiliate, or at the Annual General Meeting in Victoria on Tuesday, July 6 at 8:00 a.m. After further revisions (if need be), Council will begin the process of formally adopting the *Statement and Code* and revising the Institute's by-laws accordingly.

## Position Papers

Two position papers, one on sustainable development and the other on sustaining water resources, are being developed by members. The entire membership will have an opportunity to discuss these positions before formal adoption. If you would like your ideas to be considered during the development of these papers, write or call the National Office. We'll pass them on to the authors.

Council has targeted three other priority areas: native issues, urban sprawl, and economic and equity issues. Call us for the *Guidelines for Position Papers* (distributed to members in June) and submit your proposal. CIP pays an honorarium of up to \$1,000 for the development of a paper, once a proposal is approved. We welcome suggestions for additional topics where you feel that it is appropriate or timely for the membership to become involved.

## Habitat 2000

The preliminary "call for papers" for the Institute's 1994 conference has gone out. This

conference is being held jointly with the International Federation for Housing and Planning in Edmonton, Alberta, September 18-23. A broad range of human settlement issues, both present and future, will be addressed, although the central theme will be the needs and opportunities that face the world on the threshold of the 21st century. Topics of particular interest are the housing and settlement needs of indigenous peoples, in both developed and developing countries; the problem of affordable housing and possible solutions; planning for an aging population;

## Énoncé des valeurs morales et Code de conduite professionnelle

La version de l'*Énoncé des valeurs morales* et du *Code de conduite professionnelle* qui vous a été distribuée en juin renferme les commentaires que nous avons reçus après avoir fait circuler la première ébauche aux associations affiliées et aux universités à l'automne 1992. Nous vous invitons à lire et à discuter de ces documents avec vos collègues. Vous pouvez formuler vos commentaires directement à l'Institut ou par le biais de votre association affiliée ou, encore, lors de

l'assemblée générale annuelle, qui se tiendra à Victoria, le mardi 6 juillet à 8 h. Après avoir intégré vos commentaires au texte (s'il y a lieu), le Conseil amorcera le processus d'adoption officiel de l'*Énoncé* et du *Code* et modifiera le *Règlement* de l'Institut en conséquence.

## Énoncés de position

À l'heure actuelle, des membres de l'Institut élaborent deux énoncés de position, le premier portant sur le développement viable et l'autre sur la conservation des ressources aquatiques. Tous les membres auront l'occasion de discuter de ces énoncés de position avant qu'ils ne soient adoptés officiellement. Vous pouvez nous faire part de vos idées pendant l'élaboration de ces énoncés de position en écrivant ou en appelant au Bureau national. Nous les transmettrons aux auteurs.

Le Conseil a établi trois autres secteurs de priorité : les questions autochtones, l'étalement urbain ainsi que les questions touchant l'économie et l'égalité. Veuillez nous appeler pour obtenir une copie du document sur les *Lignes directrices touchant les énoncés de position* (distribué aux membres en juin) et présentez-nous votre proposition. L'ICU versera des honoraires pouvant aller jusqu'à 1 000 \$ pour l'élaboration d'un énoncé de position, sur approbation de la proposition. Nous vous invitons à nous proposer d'autres sujets que vous jugez appropriés.

## Habitat 2000

Nous avons déjà envoyé l'«appel préliminaire de propositions» pour le congrès 1994 de l'Institut, qui sera organisé conjointement avec la Fédération internationale pour l'habitation, l'urbanisme et l'aménagement des territoires, à Edmonton, en Alberta, du 18 au 23 septembre. Diverses questions présentes et

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*CIP is a member of the Commonwealth Association of Planners and the International Federation for Housing and Planning.*

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innovations in residential design and housing technology; implications of the new environmentalism and the need for sustainable development; and the respective roles of the public and private sectors in all aspects of urban development.

To be considered for inclusion in one of the paper or poster sessions, an abstract of 200 to 250 words must be submitted to the Program Committee by

December 31, 1993. A formal call for papers will be out shortly. In the meantime, inquiries or suggestions should be directed to: Brenda Fefferman, Planning and Development Department, City of Edmonton, 10310-102 Avenue, Edmonton, Alberta T5J 2X6; fax: (403) 428-4665. ♦

*Sylvia Franke*  
*Executive Director*

futures touchant les établissements humains seront abordées, mais le thème central portera sur les besoins et les perspectives à l'échelle mondiale à l'aube du XXI<sup>e</sup> siècle. Les sujets qui suscitent un intérêt particulier sont les besoins en matière de logement et d'établissement des peuples autochtones, tant dans les pays développés qu'en voie de développement; le problème de l'abordabilité du logement et les solutions possibles; la planification dans le contexte d'une population vieillissante; les innovations au niveau de la conception résidentielle et de la technologie de l'habitation; l'incidence du nouveau mouvement environnemental et la nécessité d'assurer un développement viable; ainsi que les rôles

respectifs des secteurs public et privé dans tous les aspects du développement urbain.

Pour que votre proposition soit considérée pour l'une des séances sur les rapports ou les affiches, vous devez faire parvenir un résumé de 200 à 250 mots au Comité du programme d'ici le 31 décembre 1993. Nous enverrons bientôt un appel de propositions officiel. Entre temps, veuillez adresser vos demandes ou vos suggestions à : Brenda Fefferman, Service de l'urbanisme et de l'aménagement, Ville d'Edmonton, 10310-102<sup>e</sup> avenue, Edmonton (Alberta) T5J 2X6; télécopieur : (403) 428-4665. ♦

*Sylvia Franke*  
*Directrice générale*

**We welcome the following new members  
to the Institute:  
Nous souhaitons la bienvenue au sein de l'Institut  
aux nouveaux membres suivants :**

- Lance Berelowitz, MCIP, Vancouver, BC
- André Blouin, MICU, Montréal, PQ
- Peter Curry, MCIP, Calgary, AB
- Joe Erceg, MCIP, Mission, BC
- Odette Isabel, MICU, Montréal, PQ
- Nancy Knight, MCIP, Vancouver, BC
- Martin Lee-Gosselin, MICU, Ste-Pétronille, PQ
- James Mackie, MCIP, Edmonton, AB
- P. Kristine Menzies, MCIP, Oro, ON
- Mark Sasges, MCIP, St. Albert, AB
- Dana Stewart, MCIP, Winnipeg, MB
- Eric Vance, MCIP, Port Moody, BC



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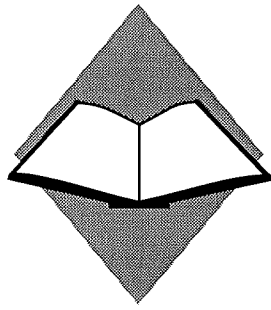
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**Rural Land Management: Perspectives from Canada and the U.S.**

Ed. by Floyd Dykeman, Rural and Small Town Research and Studies Programme, Mount Allison University, Sackville, New Brunswick, 1991, 168 pp.

Reviewed by Ian Wight, MCIP, and Brodie Porter, MCIP

In contrast to its dominating urban cousin, the literature on Canadian rural planning is scant. As Dykeman observes in his foreword: "Rural planning has been the adaptation of urban planning approaches for rural environments. ... [A]pproaches to rural land management are needed providing a fit with the realities of rural values and traditions as well as institutions." The purpose of the volume is to provide insight into some of the issues and innovative approaches that can be considered by rural planners as they search for more effective and efficient tools.

A mixed bag of nine papers by 14 authors, presented at a 1988 "Resolving Rural Development Conflicts" conference, this volume complements an earlier product from Dykeman's programme.<sup>1</sup> The eclectic collection includes papers on rural landscape and roadside planning; routing transmission rights-of-way through rural-urban transition areas; growth management via the purchase of development rights; highway interchange land use conflict; an international park to resolve a U.S./Canada territorial conflict; provincial land use planning policies; and resource management databases.

In the first two papers—probably the best in the volume—author Randall Arendt draws heavily on the Centre for Rural Massachusetts' award-winning design manual for conservation and development, based on a project dealing with change in the Connecticut River Valley. Focussing on the estab-

lishment of "islands" of clustered development that maintain rural characteristics while conserving the essence of surrounding rural areas, the work acknowledges that the rural countryside is not a static entity but the product of continuous interaction between man and land. Although we believe in the potential of innovative design to accommodate development pressures on rural communities, we question if the clustering tradeoff will secure overall rural characteristics or establish a trend toward continued higher-density development in rural areas. Nevertheless, there is enough in the papers to recommend the design manual as a worthy acquisition.

Guidelines for planning hydro-line rights-of-way as a positive integral community land use component are the product of an in-depth case study by two Ontario Hydro planners. They argue that locational guidelines within proposed developments or development redesign around a transmission facility can play a major role in minimizing impacts. Framed in the context of a developing urban-rural fringe, the piece has broader utility as a checklist for reviewing any transmission right-of-way proposals and as a body of principles for capitalizing on such developments.

In a paper by three university economists, the "purchase of development rights" is discussed as a tool for farmland protection in a growth management context. The use of this tool is recommended when zoning loses its protective lustre to expose its fundamental obstructionist qualities and after property tax system differentials become ineffective in a rising price market. While more readily available in the U.S., it can be used for open space preservation and would seem to merit greater consideration by land trusts and conservation agencies — if more enabling

legislation were enacted in Canada.

In a short review it is difficult to do justice to every paper. Overall, the book contributes to the subject of rural land management when there is little else available.<sup>2</sup> The attempt to provide an overview is successful but preliminary and exploratory. The need to draw on U.S. experience limits applicability for Canadian practitioners, but the book offers many useful insights on emerging issues. In this respect the book achieves its purpose.

The editor acknowledges that the collection is not a definitive statement on rural planning. However, it is sufficiently stimulating to merit a recommendation to planning practitioners. Despite its modest, eclectic nature, it is headed in the right direction: toward the articulation of a purer, more direct rural planning ethic to guide our practice. ♦

IAN WIGHT IS THE MANAGER OF AND BRODIE PORTER IS A SENIOR PLANNER IN THE LOCAL PLANNING UNIT OF THE ISLANDS TRUST, A UNIQUE FORM OF LOCAL GOVERNMENT FOR LAND USE PLANNING PURPOSES, BASED IN VICTORIA, B.C., AND MANDATED TO "PRESERVE AND PROTECT" THE TRUST AREA.

**NOTES**

<sup>1</sup>Dykeman, Floyd (ed.). *Integrated Rural Planning and Development*. Sackville, New Brunswick: Rural and Small Town Research and Studies Programme, Mount Allison University, 1988.

<sup>2</sup>A recent updated U.S. contribution also worth seeking out is *Rural Environmental Planning for Sustainable Communities*, by Frederic O. Sargent et al., Island Press, Washington, D.C., and Covelo, California, 1991.

**Into the 21st Century: A Handbook for a Sustainable Future**

by Brian Burrows, Alan Mayne and Dr. Paul Newbury, Adamantine Press Limited, Twickenham, England, 1991, 442 pp.

Reviewed by Bill Brown, MCIP

This book is intended to persuade readers that a major shift in our global problem-solving and policy-making processes is necessary if the future of life on this planet is to be secured.

The book is divided into three parts. In Part One, the authors take a cursory but efficient look at the major problems facing the world, including a faulty global economy, uncontrolled population growth, world hunger, the inefficient and inappropriate use of energy and other resources, pollution, urban issues, human conflict and the potential negative impacts of science and technology. Part Two considers six paradigms that promote a more holistic approach to problem-solving and policy formulation. "Integrated Planning and Policies," which includes such topics as the uses and abuses of forecasting, the potentials of scenario planning and the need to include environmental impact assessment in the planning process, is of particular interest. In Part Three, three global scenarios — based on information found in the first two parts of the book — are presented. At the end of the book is a 65-page annotated bibliography referencing mainly European publications and providing insight into a body of literature unfamiliar to many Canadian planners.

The text is well written and easy to follow. Each chapter concludes with "Exploring Further," an extensive catalogue of references for suggested further reading. This is organized according to the order in which the material appears in the chapter. As



well, each "Exploring Further" includes a list of thought-provoking topics for further discussion. In the chapter on urban problems, for example, readers are encouraged to "review and discuss the patterns of urban development in their own country and region, comparing and contrasting them with urban trends in the developed and developing countries."

The book does have several shortcomings. Although the word "sustainable" appears in the title, its meaning is hardly discussed. The authors conform to the World Conservation Strategy's definition of "sustainable development"; however, this definition has come under considerable criticism, and the literature is full of debate over the meaning of the term. A summary of this debate would have been helpful. As well, there is only a cursory reference to the laws of thermodynamics and to the law of the conservation of matter. Since these laws are the foundation of all global processes, they must be thoroughly understood before world problems can be fully appreciated. Conspicuously absent from Part Two ("New Paradigms") is a chapter on chaos theory and its potential to reveal the nature and extent of current problems as well as possible solutions. Finally, references to Canadian concerns and initiatives are unfortunately (but understandably) scarce in this British text.

From a planning perspective, the book's most important message is the need to adopt a systematic, integrated and holistic approach to problem identification and policy development. Despite a few disappointments, I found the book stimulating and would recommend it to all planners considering the need for a new planning paradigm. ♦

BILL BROWN HAS AN M.A. IN REGIONAL PLANNING AND RESOURCE DEVELOPMENT FROM THE UNIVERSITY OF WATERLOO. HE IS CURRENTLY EMPLOYED AS A PLANNING OFFICER AT THE SOUTHEAST ALBERTA REGIONAL PLANNING COMMISSION IN MEDICINE HAT.

## Recently Received/Nouvelles publications

The following books and publications have been received and are available for review. Individuals interested in reviewing any of these books are invited to contact Heather Lang-Runtz, HLR & Associates, 51 Ottawa St., Arnprior, Ontario K7S 1W9; (613) 623-6975.

Voici la liste des publications et des ouvrages que nous avons reçus récemment. Les personnes intéressées à faire le compte rendu de l'un ou l'autre de ces ouvrages sont invitées à communiquer avec Heather Lang-Runtz, HLR & Associates, 51, rue Ottawa, Arnprior (Ontario) K7S 1W9; (613) 623-6975.

*House, Home, and Community: Progress in Housing Canadians, 1945-1986*, edited by John R. Miron, McGill-Queen's University Press, 1993, 454 pp.

*The Changing Social Geography of Canadian Cities*, edited by Larry S. Bourne and David F. Ley, McGill-Queen's University Press, 1993, 495 pp., \$29.95 (paper).

*Covering the Environment*, by Michael Keating, National Round Table on the Environment and the Economy, 1993, 164 pp.

*Case Studies of Some Suburban Office Centres in Toronto*, by Malcolm Matthew, Institute of Urban Studies, 1993, 132 pp., \$20.

*Planning and Development Handbook for the City of Edmonton*, by the City of Edmonton Planning and Development, Department, 1993, 50 pp. plus appendices.

*A Select, Annotated Bibliography on Sustainable Cities*, by Mary Ann Beavis and Jeffrey Patterson, Institute of Urban Studies, 1992, 93 pp. plus index, \$20.

*Pour un développement urbain durable au Canada : la mise en oeuvre du concept*, par Virginia Maclaren, ICURR Press, 1992, trois volumes.

*City Images: An Internal View*, by Hok-Lin Leung, Ronald P. Frye & Company, 1992, 291 pp.

*Toward Sustainable Communities: A Resource Book for Municipal and Local Governments*, by Mark Roseland, National Round Table on the Environment and the Economy, 1992, 340 pp.

*Logement et nouveaux modes de vie*, par Jocelyn Duff et François Cadotte, Éditions du Méridien, 1992, 232 pp.

*Toronto Places: A Context for Urban Design*, ed. by Marc Baranes and Larry Richards, University of Toronto Press, 1992, 107 pp., \$50.

*Climate-Sensitive Urban Space: Concepts and Tools to Humanize Cities*, by Boudewijn Bach and Norman Pressman, Delft University of Technology, 1992.

*Commuting Trends in Metro's Suburban Centres* (Paper #38), by Andrew Brown, Program in Planning, University of Toronto, 1992, 34 pp.

*Guide de conception des avant-projets routiers*, Les Publications du Québec, 1991, 257 p.

## Manual Helps Speed Up Approvals

A user-friendly manual designed to help guide developers and planning consultants through the development approval process has been published by Toronto's Planning and Development Department. Featured in the 280-page *Development Approval Manual* are development approval processes and guidelines covering every aspect of site evaluation, land development and building construction; a master chart showing how all the processes link; a directory of appropriate staff; and a section on how the various committees operate. The \$76 manual will be updated every six months. ♦

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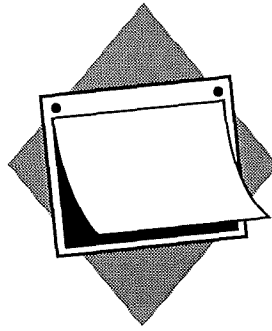
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## TIMELINE

A CALENDAR OF EVENTS



## À L'AGENDA

CALENDRIER DES ACTIVITÉS

### CONFERENCES

#### August

"Actively Ensuring a Lasting Legacy," Canadian Railways to Greenways national conference. August 13-14, Trent University, Peterborough, Ontario. Contact: Rails to Greenways Network National Conference, c/o The Frost Centre for Canadian Heritage and Development Studies, Trent University, Peterborough, Ont. K9J 7B8; fax: (705) 748-1795.

"Interprovincial Cooperation in Planning," Atlantic Planners Institute annual conference. August 25-27, Mill River, Prince Edward Island. Contact: Glenn Roberts, Conference Chair; (902) 368-4872.

"Kananaskis '93: Crossing Paths," conference of the International Association of Public Participation Practitioners. August 31-September 1, Kananaskis, Alberta. Contact: IAP3-Local Organizing Committee, 8th Floor, 9942-108 Street, Edmonton, Alberta T5K 2J6; (403) 427-5598.

#### September

Velo-City Conference. September 6-10, Nottingham, U.K. Contact: World Health Organization, Regional Office for Europe; +45-39-17-17-17.

4th Congress of the World Association of Major Metropolises. September 21-24, Montreal. Contact: Montreal Urban Community, 1717, boul. René-Levesque est, bureau 350, Montreal, Quebec H2L 4T3; (514) 280-4068.

"Streets & Spaces for People." September 21-24, Melbourne, Australia. Contact: Kahren Giles, The Meeting Planners, 108 Church Street, Hawthorn 3122; (03) 819-3700.

"INTA 17," 17th World Conference of the International Urban Development Association. September 26-October 1, Hong Kong. Contact: INTA International Secretariat, Nassau Dillenburgerstraat 44, 2596 AE, The Hague, The Netherlands.

"Adapting in a Changing World," Association for Preservation Technology International's 25th conference. September 29-October 2, Ottawa. Contact: Robert Hunter, APT CAN Conference Chair; (819) 997-6974.

#### November

University of Waterloo, School of Urban and Regional Planning, Toronto Alumni Dinner. "From Kennedy to Kruger and Beyond," featuring Douglas Colbourne, Interim Chair of the Ontario Municipal Board. November 10, Sheraton Centre Hotel, Toronto. Contact: Sally Chown; (416) 568-8888; fax: (416) 568-8894.

#### 1994 - September

"Habitat 2000," joint congress of IFHP and CIP. September 18-23, Edmonton. *Call for Papers:* housing/settlement needs of indigenous peoples; the problem of affordable housing; planning for an aging population; innovations in residential design and housing technology; the need for sustainable development; the roles of the public and private sectors in urban development. An abstract must be submitted to the Program Committee by December 31. Contact: Brenda Fefferman, Planning and Development Department, City of Edmonton, 10310-102 Avenue, Edmonton, Alberta T5J 2X6; fax: (403) 428-4665. ♦

### CONGRÈS

#### Août

«Travaillons activement à créer un patrimoine durable», Congrès national du Réseau canadien des corridors verts, 13-14 août, Université Trent, Peterborough, Ontario. Information : Congrès national du Réseau canadien des corridors verts, a/s Centre Frost pour le patrimoine canadien et les études sur le développement, Peterborough (Ontario) K9J 7B8; télécopieur : (705) 749-1795.

«Interprovincial Cooperation in Planning», congrès annuel de la Atlantic Planners Institute, 25-27 août, Mill River, Île-du-Prince-Édouard. Information : Glenn Roberts, président du congrès; (902) 368-4872.

«Kananaskis 93: Crossing Paths», congrès de la International Association of Public Participation Practitioners, 31 août-1<sup>er</sup> septembre, Kananaskis, Alberta. Information : IAP3-Local Organizing Committee, 8th Floor, 9942-108 Street, Edmonton, Alberta T5K 2J6; (403) 427-5598.

#### Septembre

Velo-City Conference, 6-10 septembre, Nottingham, Royaume-Uni. Information : Organisation mondiale de la santé, Bureau régional pour l'Europe; +45-39-17-17-17.

4<sup>e</sup> Congrès de l'Association des grandes métropoles du monde, 21-24 septembre, Montréal. Information : Communauté urbaine de Montréal, 1717, boul. René-Levesque est, bureau 350, Montréal (Québec) H2L 4T3; (514) 280-4068.

«Streets and Spaces for People», 21-24 septembre, The Regent, Melbourne, Australia. Information : Kahren Giles, The Meeting Planners, 108 Church Street, Hawthorn 3122; (03) 819-3700.

«INTA 17», 17<sup>e</sup> Congrès mondial de la International Urban Development Association, 26 sept.-1<sup>er</sup> Oct., Hong Kong. Information : INTA International Secretariat, Nassau Dillenburgerstraat 44, 2596 AE, La Haye, Pays-Bas.

«Adapting in a Changing World» est le 25<sup>e</sup> Congrès international de l'Association pour la préservation et ses techniques, 29 sept.-2 oct., Ottawa. Information : Robert Hunter, président du congrès APT CAN; (819) 997-6974.

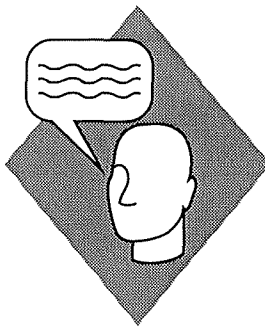
#### Novembre

University of Waterloo, School of Urban and Regional Planning, Banquet des anciens de Toronto. «From Kennedy to Kruger and Beyond», avec Douglas Colbourne, président intérimaire de la Commission municipale de l'Ontario, 10 novembre, Sheraton Centre Hotel, Toronto. Information : Sally Chown; (416) 568-8888; télécopieur : (416) 568-8894.

#### 1994 - septembre

«Habitat 2000», un congrès conjoint de la FIHUAT et de l'ICU, 18-23 septembre, Edmonton. *Appel de propositions :* établissement des peuples autochtones; l'abordabilité des logements; la planification dans le contexte d'une population vieillissante; les innovations au niveau de la conception résidentielle et de la technologie de l'habitation; le développement viable; ainsi que les rôles des secteurs public et privé dans développement urbain. Vous devez faire parvenir un résumé au Comité du programme d'ici le 31 décembre. Information : Brenda Fefferman, Service de l'urbanisme et de l'aménagement, Ville d'Edmonton, 10310-102<sup>e</sup> Avenue, Edmonton (Alberta) T5J 2X6; télécopieur : (403) 428-4665. ♦





## Planning for GIS

Richard M. Levy

**D**uring these fiscally difficult times, many communities are being forced to do more with less, yet the public demand for higher-quality service has never been greater. Because a Geographic Information System (GIS) enables one to do more with less, it is well worth the initial implementation costs.

There are many management and policy benefits to being able to display a municipality's database in spatial form. A GIS has demonstrated its value when access to information must be immediate: its quick responsiveness assisted emergency and other municipal services staff in the tragic aftermath of Hurricane Andrew and the Los Angeles riots. However, it is the day-by-day bread-and-butter issues that often justify the implementation of a GIS program: to manage the streets, utilities, sewers and water systems that comprise a municipality's physical infrastructure. Tracking building permits, evaluating changes in zoning, monitoring tax assessments, scheduling maintenance are other basic planning functions of a GIS.

As well, many planning departments are using this technology to evaluate the delivery of social and public services. The ability to display a wide range of demographic and economic data linked to physical features makes a GIS useful for evaluating sites for libraries, parks, emergency facilities and other public amenities.

Site analysis, however, is not unique to the public sector. Many major retailers and developers have also found a GIS to be an indispensable tool for assembling proprietor databases from publicly-held sources of data.

Communities that recognize the commercial value of GIS data have already looked at marketing possibilities as part of their cost-recovery strategies. Before taking such action, however, careful consideration should be paid to the public's right to access. User fees for data built with tax revenues can create new barriers to economic advancement as those who can least afford the cost are restricted from acquiring this information. While major land developers, retailing chains and insurance companies can easily bear the cost of buying GIS data, the independent downtown retailer, start-up company, homebuilder, community group or individual may have difficulty purchasing the data and also may not have the hardware to display it. Finding the revenues to support a GIS program should not take precedence over the public's right to access the data.

**“A GIS can be an invaluable planning tool. Because it can be used to manage and manipulate data with low-cost, high-quality results, planners will be able to work more efficiently with fewer resources. Those who ignore the usefulness of a GIS will not profit from its power as a strategic planning tool.”**

A GIS can be a powerful aid in decision-making and policy review, but demands a long-term financial commitment. Successful systems require hardware and software acquisi-

## Les SIG en urbanisme

Richard M. Levy

**E**n cette période de restrictions budgétaires, beaucoup de collectivités doivent faire plus avec moins. Pourtant, la population exige toujours des services de meilleure qualité. Puisqu'un système d'information géographique (SIG) permet de faire plus avec moins, son coût initial en vaut la peine.

La présentation d'une base de données municipale sous une forme spatiale offre beaucoup d'avantages au niveau de la gestion et des politiques. Le SIG a démontré son utilité lorsqu'il faut avoir accès à l'information immédiatement : sa capacité de répondre rapidement a été d'une grande utilité pour le personnel d'urgence et les autres services municipaux à la suite du tragique ouragan Andrew et des émeutes de Los Angeles. Cependant, ce sont souvent les tâches quotidiennes élémentaires telles que la gestion du réseau routier, des services publics, des systèmes d'égout et d'aqueduc qui forment l'infrastructure physique d'une municipalité qui justifient l'implantation d'un SIG. Le suivi des permis de construction, l'évaluation des modifications de zonage, le contrôle des évaluations foncières et l'établissement du calendrier d'entretien sont d'autres fonctions essentielles d'un SIG dans le domaine de l'urbanisme.

Par ailleurs, beaucoup de services d'urbanisme ont recours à cette technologie pour évaluer la prestation des services sociaux et publics. Grâce à sa capacité de montrer un large éventail de données démographiques et économiques intégrées à des éléments physiques, le SIG peut s'avérer utile pour évaluer des emplacements pour des bibliothèques, des parcs, des installations d'urgence et d'autres services collectifs.

Toutefois, l'analyse de sites n'est pas unique au secteur public. Beaucoup de grands détail-

lants et promoteurs trouvent également que le SIG est un outil indispensable pour constituer des bases de données à partir de sources de données publiques.

Les collectivités qui reconnaissent la valeur commerciale des données provenant d'un SIG ont déjà envisagé des possibilités de commercialisation dans le cadre de leur stratégie de récupération des coûts. Cependant, avant d'envisager une telle mesure, il faut accorder une attention particulière au droit d'accès du public. Les frais d'utilisation pour des données obtenues à partir de recettes fiscales peuvent créer de nouveaux obstacles au progrès économique, puisque ceux qui peuvent le moins s'en permettre le coût n'ont pas accès à cette information. Alors que les grands promoteurs fonciers, les grandes chaînes de magasins et les compagnies d'assurance peuvent facilement assumer le coût des données d'un SIG, les détaillants indépendants, les nouvelles entreprises, les petits constructeurs résidentiels, les groupes communautaires ou les particuliers peuvent avoir de la difficulté à acheter les données. Ils peuvent aussi ne pas disposer du matériel informatique requis pour consulter les données. Il ne faut pas que la recherche de revenus pour appuyer un SIG ait préséance sur le droit du public d'avoir accès aux données.

Un SIG peut être un outil puissant au niveau de la prise de décisions et de l'examen des politiques, mais il exige un engagement financier à long terme. Les systèmes efficaces nécessitent l'acquisition de matériel et de logiciels ainsi qu'une formation du personnel. Puisqu'un SIG doit s'intégrer à l'esprit et à la planification de tout l'organisme, il faudra peut-être aussi prévoir une restructuration en profondeur. Si cet outil n'est accessible qu'à quelques employés, il sera impossible d'en tirer pleinement profit.

tion and staff training. Because a GIS needs to become part of the thinking and planning of the entire organization, restructuring may also be necessary. Giving this tool to only a few staff members will not generate the gains expected of a GIS.

**W**hat can a GIS do for you? By integrating data from modelling and simulation programs, this technology can provide insight into the development of strategies for advancing economic and social policy. Complex scenarios can be better appreciated when displayed visually. A GIS can also expand the range of alternatives with respect to the planning of transportation, land use, housing, neighbourhoods and economic development. It can provide an integrated view of a city's historical development (a plus for a municipality's political leaders) and can be used to promote private/public initiatives by clarifying urban development issues. A comprehensive database used to focus the energy of traditionally disparate groups could result in creative solutions to many of a municipality's social and economic problems. A GIS can also be harnessed to clearly-defined municipal initiatives, such as housing and job creation.

**T**o build support and appreciation for what a GIS can do, it is advisable to encourage public participation and interaction. As with many on-line databases, a GIS is capable of providing a wide range of information to a community. With careful systems design, planners can access data and be offered a window to public opinion and concerns.

To achieve these goals, a GIS application must be user-friendly. If only a few members of a municipality's engineering or public works department are able to use this technology, the applications for this new planning tool will be limited. Furthermore, many users are finding that the cost and complexity associated with high-end systems make them difficult to distribute among a large number of users. Down-loading

data from work-stations to friendlier and cheaper PCs is one way of encouraging a wider distribution. Although there are dangers associated with running parallel systems, the PC solution should not be overlooked.

Ultimately, a GIS will be accepted for the quality of the output and the format of the interface. Full integration of a community's physical features with its demographic and economic data will provide an opportunity to present a more complete view of our cities. Walk-throughs and fly-overs will strengthen the connection between policy and its impact on the physical form. For many, this is the only way the totality of an urban area can be understood. The retailer, commercial real estate developer and home-buyer are among those whose comprehension of policy can be improved by having a three-dimensional view. Unfortunately, it may be some time before planning departments can afford a GIS with 3-D capability. In the interim, experimentation with hypermedia, multi-media and CAD can be used to create virtual realities of our often misunderstood urban landscape.

A GIS can be an invaluable planning tool. Because it can be used to manage and manipulate data with low-cost, high-quality results, planners will be able to work more efficiently with fewer resources. Those who ignore the usefulness of a GIS will not profit from its power as a strategic planning tool. ❖

*RICHARD M. LEVY IS AN ASSOCIATE PROFESSOR OF URBAN PLANNING AT THE UNIVERSITY OF CALGARY, IN THE FACULTY OF ENVIRONMENTAL DESIGN. HIS RESEARCH AND TEACHING INVOLVE THE USE OF CAD AND COMPUTER VISUALIZATION IN URBAN DESIGN. PROFESSOR LEVY RECEIVED HIS PH.D. FROM THE COLLEGE OF ENVIRONMENTAL DESIGN, UNIVERSITY OF CALIFORNIA, BERKELEY. HE CAN BE REACHED AT (403) 220-3633; FAX: (403) 284-4399.*

**Q**ue peut vous offrir un SIG ? En intégrant les données de programmes de modélisation et de simulation, cette technologie peut vous éclairer sur l'élaboration de stratégies pour la mise en oeuvre des politiques économiques et sociales. On perçoit mieux les scénarios complexes lorsque ceux-ci sont présentés sous forme visuelle. Un SIG peut également élargir le choix de solutions pour la planification des transports, des fonctions urbaines, du logement, de l'occupation du sol, des quartiers et du développement économique. Il peut aussi fournir une image intégrée du développement historique d'une ville (un avantage pour les élus municipaux) et servir à la promotion d'initiatives privées-publiques en éclaircissant les questions de développement urbain. Une base de données détaillées qui canaliserait l'énergie de groupes normalement disparates pourrait donner lieu à des solutions créatrices pour résoudre une bonne part des problèmes sociaux et économiques d'une municipalité. Un SIG peut également servir pour des initiatives municipales précises, comme le logement et la création d'emplois.

**A**fin d'obtenir des appuis et une meilleure compréhension des capacités d'un SIG, il est conseillé d'encourager la participation et l'interaction du public. Comme beaucoup d'autres bases de données à accès direct, un SIG peut fournir un large éventail de renseignements à une collectivité. Si les systèmes sont bien conçus, les urbanistes peuvent avoir accès aux données ainsi qu'un aperçu de l'opinion et des préoccupations publiques.

Pour réaliser ces objectifs, le SIG doit être facile à utiliser. Si seulement quelques membres d'un service municipal d'ingénierie ou de travaux publics peuvent utiliser cette technologie, les applications de ce nouvel outil d'urbanisme seront limitées. En outre, beaucoup d'utilisateurs trouvent que le coût et la complexité des systèmes de haute technologie empêchent leur distribution à un grand nombre d'utilisateurs. Le transfert des données des postes de

travail à des ordinateurs personnels plus faciles à utiliser et moins chers serait un moyen d'encourager une plus grande distribution. Bien qu'il y ait des dangers associés à l'implantation de systèmes parallèles, la solution de l'ordinateur personnel ne devrait pas être négligée.

En bout de ligne, un SIG sera accepté pour la qualité de sa production et le format de son interface. L'intégration complète des caractéristiques physiques d'une collectivité avec ses données démographiques et économiques nous permettra d'obtenir une image plus complète de nos villes. Les simulations renforceront le lien entre les politiques et leur incidence sur les formes physiques. Pour beaucoup, c'est la seule façon de bien comprendre l'ensemble d'un secteur urbain. Le détaillant, le promoteur immobilier et l'acheteur de maison, par exemple, peuvent mieux comprendre les politiques en ayant une vue tridimensionnelle. Malheureusement, il peut s'écouler beaucoup de temps avant que les services d'urbanisme n'aient les moyens d'acquiescer un SIG ayant une capacité tridimensionnelle. D'ici là, on peut expérimenter avec les hypermédias, les multimédias et la CAO afin de créer des réalités virtuelles de notre paysage urbain, trop souvent mal compris.

Un SIG peut s'avérer un outil fort précieux en urbanisme. Puisqu'il peut servir à gérer et à manipuler des données à faible coût et procurer des résultats de grande qualité, les urbanistes pourront travailler de façon plus efficace avec moins de ressources. Ceux qui ignorent l'utilité d'un SIG ne profiteront pas de sa puissance à titre d'outil de planification stratégique. ❖

*RICHARD M. LEVY EST PROFESSEUR ASSOCIÉ D'URBANISME À LA UNIVERSITÉ DE CALGARY, FACULTY OF ENVIRONMENTAL DESIGN. SES RECHERCHES ET SES MÉTHODES D'ENSEIGNEMENT FONT APPEL À LA CAO ET À LA VISUALISATION PAR ORDINATEUR DANS LE DESIGN URBAIN. M. LEVY DÉTIENT UN DOCTORAT DU COLLEGE OF ENVIRONMENTAL DESIGN, À LA UNIVERSITY OF CALIFORNIA, À BERKELEY. ON PEUT LE REJOINDRE AU (403) 220-3633; TÉLÉCOPIEUR (403) 284-4399.*



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## 1 Marchés de l'habitation canadiens

N° de cat. : NH12-7F

Analyse les tendances qui influent sur les marchés de l'habitation au Canada et en évalue l'importance pour l'avenir. Renferme les données les plus récentes sur le nombre de Canadiens pouvant accéder à la propriété. Publication trimestrielle.

44 \$\* (abonnement d'un an)



## 2 Perspectives nationales du marché de l'habitation

N° de cat. : NH12-9F

L'évaluation la plus complète de l'évolution des conditions du marché de l'habitation au Canada. Renferme des prévisions concernant le prix de vente des maisons, les mises en chantier, les taux de vacance et les principaux indicateurs économiques au pays et dans les différentes provinces au cours des deux prochaines années. Publication trimestrielle.

66 \$\* (abonnement d'un an)

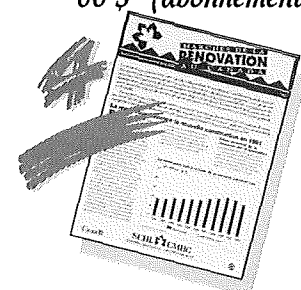


## 3 Tendances du marché hypothécaire

N° de cat. : NH12-8F

Examine l'évolution des marchés hypothécaires primaire et secondaire au Canada et surveille les tendances qui se dessinent aux États-Unis. Renferme des articles rédigés par des spécialistes des secteurs public et privé qui analysent les tendances du financement hypothécaire. Publication trimestrielle.

44 \$\* (abonnement d'un an)



## 4 Marchés de la rénovation au Canada

N° de cat. : NH1-3-1992F

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