

# Informing Design Charrettes: Tools for participation in neighbourhood-scale planning

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## 1 Introduction

The authors have been developing computer-based decision support tools to bring education, visualization and modeling to design charrettes (design-oriented participatory community planning events) and other design-oriented public workshops. These tools have been created to engage the public together with professionals in community planning and design. One goal of the work is to close a challenging gap in knowledge and understanding between professionals and stakeholder groups charged with generating and evaluating planning alternatives. Design charrettes are well supported by qualitative, design-based participatory methods that engage the public, such as visioning and brainstorming techniques that draw out aspirations and preferences about future growth. In order to achieve more sustainable models of urban form, charrettes must also be supported by quantitative, analysis-based methods that model and evaluate performance against indicators of sustainable development such as housing density, and access to transit and services.

Central to the authors' decision support tools is a multimedia database of measured parcel scale case studies entitled **Elements of Neighbourhoods** (EoN). When linked to land use plans through a Geographic Information System and related applications, these tools help a community visualize, measure and compare competing alternatives in areas of land use, transportation, environmental quality, infrastructure and cost. With tools such as these it is possible to equitably compare alternative plans through visualization and measurement

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based upon the schematic design descriptions and information generated by charrette-based planning process. This paper identifies the need for informed, time-sensitive public decision-making in community planning, introduces the design charrette as one effective method, introduces the authors' decision support tools designed to close three gaps in knowledge, methods and scale when applied to the design charrette, and reviews two applications of these tools.

## 2 Gaps: Knowledge, Methods, Scale

The capacity to plan for more sustainable ecological, social and economic futures is prominent among the goals of governments, business and civil societies worldwide. A particular concern has been a need to mitigate the negative impacts of rapid rates of urbanization. Most cities outside of Europe are projected to double in population and some will more than double in economic output over the next 40 years. Expansions of this scale inevitably strain, and may break, the ecological fabric and infrastructure of cities and regions ([Wackernagel & Rees, 1996](#)). Major contributors are the physical patterns within which we allocate land and organize land uses and infrastructure as cities grow. These patterns in North America are highly inefficient and becoming more so. Contemporary suburban development patterns, for example, consume three times more land per capita than was the norm for neighbourhoods designed just two generations ago. The land use mix and transportation networks embedded within them require more roads and more automobile trips which generate an incumbent increase in transportation-related energy consumption, air pollution and greenhouse gas emissions. The significant associated loss of land and increase in impervious surface areas (roads, parking lots, roofs etc.) also increase stormwater runoff, inhibit recharge of natural aquifers and increase erosion and non-point source pollutants in streams and rivers ([U.S. Environmental Protection Agency, 2001](#); [U.S. Bureau of the Census, 1998](#); [Katz & Lang, 2003](#)).

This need not be so. Much of the basic science, planning and design knowledge to build better cities exists. So does the desire of many people to live in them. Yet, despite wide public interest in 'doing better', greater scientific understanding of the issues, better access to knowledge of viable solutions and professional expertise to plan and design them, there remains a significant disconnect between intentions and practice. The ubiquitous and persistent replication of high cost and sprawling, high environmental impact patterns of development continues unabated ([Girling & Kellett, 2005](#); [Steuteville, 2004](#)). A significant part of the problem can be attributed to gaps in the decision-making processes that connect public opinion and policies to on-the-ground physical planning and implementation of neighbourhoods, the increment of growth in most cities. One is a gap of knowledge in local-level decision-making where participatory planning and design processes are disconnected from knowledge sources needed for informed decision-making. A second is a gap of method where the visual and spatial form and character of contemplated development pattern needs to be linked to measured consequences. A third is a gap of scales where local actions

should be linked to regional and global effects (and vice versa). These gaps are substantially intertwined and all must be filled if prevailing development patterns are to shift toward better performing alternatives. The marriage of computer-based modeling and measuring tools with the charrette process offers an innovative means to fill the first two and enables others working at regional scales to fill the third.

### 3 Decision Support in Community Planning

Computers have been routinely applied to information management tasks in urban planning since the 1960's. However, it has been relatively recent (early to mid-1990's) improvements in the technology of processors, graphics, data storage and networked communications that facilitated corresponding improvements in software design and simulation and analysis models and enabled a sea-change in the application of computer-based tools to the more complex tasks of visualization and decision-making at the heart of planning processes. The research field of design and decision support systems contributes to these improvements by bringing knowledge from planning, design and engineering together with computer, software and modeling expertise to build new tools that support multidisciplinary and planning processes. Most of this effort has been directed toward questions and issues surrounding the considerable technical complexity of urban planning—transportation and utility infrastructure planning, for example.

Decision support tools for urban planning are of two principal types. One type includes the design-oriented tools such as workshops and charrettes customary to participatory community design processes. These are typically very visual, interactive, 'bottom-up' tools responsive to issues and priorities at the scale of individuals and parcels of land. They include techniques such as brainstorming, design gaming, and visualization techniques, and they provide many flexible and efficient means to engage large groups, facilitate collaboration and consider diverse issues across many scales. They generate tangible, accessible, visually rich products with good local 'fit.' They are often readily endorsed by the community for implementation (Sanoff, 2000). However, design-oriented tools also have liabilities. They infrequently incorporate suitable measured, analytical methods in parallel. As a result, it is difficult to evaluate or compare planning alternatives quickly or rigorously, and to evaluate the implications of local choices (about density or land use or street network design) for regional planning goals and policies (such as transportation and utility infrastructure).

The second type of decision support tools includes the analysis-oriented tools used for performance measurement and modeling. These are typically computer-based, 'topdown' tools most responsive to policy level issues and whole systems performance. They include a number of fine-grained, discipline-specific modeling tools such as EMME-2 that models automobile trip generation, traffic loads and congestion, or SWMM which models stormwater runoff and other hydrologic impacts. They also include an emerging group of integrated

modeling tools such as QUEST (<http://www.envisiontools.com>), CommunityViz (<http://www.communityviz.org>), INDEX, and PLACE<sup>3</sup>S (<http://www.energy.ca.gov/places>), that link multiple performance variables such as land use, transportation or air quality together to assess the broader impacts of planning and environmental policies. These tools, as a group, represent the most rigorous and credible means to measure and model the anticipated performance of urban planning alternatives.

Because the mathematics and computing models underlying these tools are complex, they are expert- and data- intensive and require significant investment in time and resources to apply. The more fine-grained analysis tools such as EMME-2 and SWMM are ill suited to iterative public planning processes because they require more engineering detail about an alternative than is possible from the schematic plans generated in public contexts. The time and cost necessary to overcome these obstacles is prohibitive and inhibits the translation of results between design and analysis modes quickly enough to contribute to decision making. Without this measured evidence, willingness to consider innovative but unfamiliar alternatives is severely limited.

The integrated modeling tools are more effective, but raise other issues of resolution and scale. These tools must simplify the complexity of urban patterns in order to measure them and the units of analysis and the attributes about them are, by necessity, coarse. QUEST, PLACE<sup>3</sup>S and CommunityViz, for example, aggregate data into analysis cells of many hectares that represent many blocks of urban development and do not account for significant variations in local choices about the design of the blocks and parcels within a cell. Thus, although these tools are well suited to city or regional-scale planning processes, they are often too coarse to inform processes that focus on the scale of the neighbourhood.

With Natural Resources Canada and other partners, the Design Centre for Sustainability at the University of British Columbia (UBC), Canada is developing processes and tools for design charrette-based decision support suited to the scale of community and neighbourhood. Within the spectrum of decision support tool development research, this effort is directed toward improving the interface between design and modeling by using information-rich and visually accessible processes and tools. Specifically, the work brings ‘hands on’ design tools together with ‘high tech’, computer-based modeling tools.

## 4 Charrette-based participatory processes

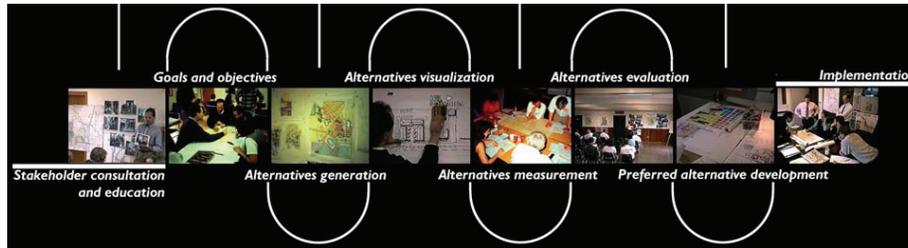
In the face of sharp debate and controversial choices about growth and land use, many jurisdictions have adopted more participatory, consensus-based planning processes and procedures; visioning sessions, public workshops, “open houses” and design charrettes, for example, are now frequently used to plan and design new neighbourhoods, renew existing ones, and redirect the goals and public policies that shape them (Sanoff, 2000; Center for Livable Communities, 1997; Oregon Citizen Involvement Advisory Committee, 1992). Design charrettes are a method of community-based planning and design common throughout North



**Figure 1:** A stakeholder group reviewing and discussing a draft community plan mid-way through a charrette. Squamish, British Columbia, Canada, April, 2005. Source: Design Centre for Sustainability

America and more recently in Europe. The term charrette derives from the French word for “cart” and refers to time-limited art and architectural design exercises conducted by the Écoles des Beaux Arts in the nineteenth century. (Projects were loaded onto a cart at the deadline.) In the contemporary planning and design context, the design charrette is typically an intensive multi-day planning process during which a team of professionals and stakeholders create a holistic growth or development plan that reflects the input of a community that is involved via a series of feedback loops (Sanoff, 2000; Lennertz, 2003; Condon, 1996).

These ‘hands-on’ workshops are characterized by a lively and open exchange of the ideas, aspirations and agendas of citizens, landowners, developers, professionals and public officials. Among the strengths of these processes is the higher probability of local ‘fit’ and investment in a negotiated outcome. (Figure 1) Among the weaknesses is the rigor of the methods used to generate and evaluate alternatives. As well, the ability to link short term, small scale local decisions to longer term, larger scale implications is often difficult. Specifically, there is a risk that without better decision support, communities will consider and pursue alternatives that perform poorly against important indicators such as environmental impact because these costs and benefits are difficult to visu-



**Figure 2:** Flow diagram of a typical design charrette process taking place over a few days. Photos are from charrettes by the authors. Source: neighbourhoodsLAB.

alize and measure intuitively, particularly within the time-constrained context of a design charrette.

Most charrettes follow a similar sequence (Figure 2). Information about goals and planning issues is gathered, cross-referenced and shared. Alternative arrangements of land and land use are discussed. Potential plans are proposed, compared and evolved through iteration, typically involving public consultation. Eventually a preferred alternative emerges and is refined until it can be approved and implemented. Supporting tools and techniques are typically ‘low-tech’ and include survey techniques for assessing preferences, needs and goals; brainstorming techniques for generating issues and concepts; design and design gaming techniques for generating alternatives; drawing, mapping and physical modeling techniques for visualizing alternatives.

The quality and integrity of these processes depends in large part on the level of understanding, communication and consensus among the multiple people and perspectives involved. The durability of decisions made often depends on the rigor and timeliness of evaluations during the iterative process. Specifically, techniques and tools are needed to equitably measure and compare the alternatives and therefore educate participants about the many implications embedded in decisions they make. However, when important information is not presented or consequences insufficiently explained, decision-making can be flawed. Issues and choices are further compromised when long-term variables such as cost, environment, economy and quality of life impacts are not available. Environmental information, for example, is often incomplete resulting in decisions that may have adverse environmental impacts or may be disallowed in the regulatory review process. As a consequence, a new challenge for the planners, architects and landscape architects who often direct these charrette-based planning processes has become the design of the tools and techniques through which all participants can be meaningfully engaged in complex and information-intensive discussions and often very difficult decisions (Innes, 1996, 1998).

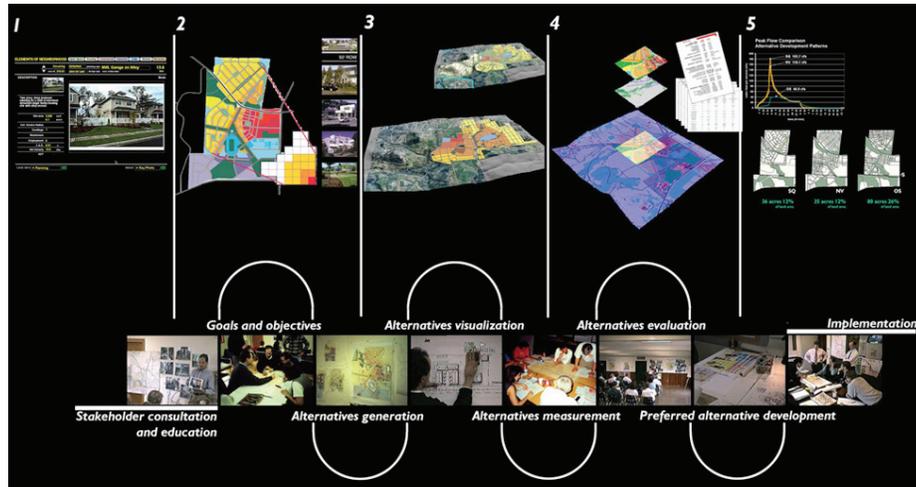
Among the contemporary examples of the design charrette applied to neighbourhood planning, the better known and documented is the work of the Miami town planning and design firm, Duany and Plater-Zyberk (DPZ). Through the 1980’s and 1990’s DPZ shaped their own version of the charrette to educate and

convince both clients and regulators of the benefits of “Traditional Neighbourhood Developments,” now more generally termed the “New Urbanism” (Katz, 1996). DPZ’s process is structured around a series of professionally mediated working sessions that move progressively and iteratively toward consensus about a neighbourhood or community scaled plan. A typical project begins with educational sessions and site analyses that reveal development opportunities and constraints. Information about the project and site is collected ahead of time and is available in the room during the charrette. Planning and design alternatives are generated. Principles are negotiated and characteristics deemed crucial to guide development are outlined. Evaluations and comparisons are made. A schematic land use plan accompanied by illustrative sketches and design guidelines is generated (Shoshkes, 1989). Numerous variations on this method are in use around North America. The National Charrette Institute (<http://www.charretteinstitute.org/>), founded by Bill Lennertz (formerly with DPZ) and Aarin Lutzenhiser, was founded to educate future facilitators and participants on this technique for participatory planning.

Other models for design charrettes also exist. Typically these involve more direct involvement of stakeholders and the public in the design process. In this model, employed by these authors, stakeholders representing a larger local group are “at the table” with professional designers and planners. They are responsible for bringing local knowledge and values to the charrette process, whereas the professionals bring professional knowledge and skills. This greater degree of hands-on involvement bring with it challenges regarding information exchange. Judith Innes and other academics interested in public participation in planning (Innes, 1996, 1998; Hester, 1990) argue that quality education is essential to understanding, communication and consensus in a public planning process. Equitable access by all participants to the best and right information at the time it is needed is important in design charrettes. Equally important is the need to relate design decisions made at the charrette to a wider set of issues and impacts.

## 5 Visualization and decision support tools for design charrettes

While much more might be written about the strengths and shortcomings of design charrettes, the focus of our work and this paper is the development of tools and techniques to make them better. To do so, tools must complement, and not compete with, the fundamentally social, highly interactive human processes that are the core strengths of design charrettes. Tools that should be most valuable are those that do not intrude on that interaction but augment participants’ abilities to visualize, remember, analyze, measure, compare, and communicate with each other. They should be adaptable to each unique project and participant group and present adequate information to inform decisions to be made, but not exceed in volume or technicality the needs of the project or



**Figure 3:** Prototypes of charrettebased decision support tools illustrated in relationship to the charrette tasks to which they are applied. Illustrated are: 1) the Elements of Neighbourhood (EoN); 2) tools for creating alternative plans and linking EoN cases; 3) visualization tools for illustrating alternatives ‘in context’; 4) reporting tools, for generating quantitative output and 5) for comparing performance attributes. Source: neighbourhoodsLAB.

the abilities of the participants. The challenge, perhaps, is fundamentally one of designing information to be available on-demand and in formats understandable to diverse audiences of varying backgrounds.

Evaluations of the alternatives, particularly evaluation through quantitative analyses, are desirable but difficult to integrate into the charrette process. In a design process, which is by its nature iterative, it is very desirable to evaluate different alternatives as they arise, before they are accepted or rejected as part of a more complex solution. Visual character and obvious functional traits such as whether a road connects significant destinations, can be relatively easily, and perhaps better, critiqued without quantitative analyses. Other issues are less obvious to the eye, and quantitative analyses such as an inventory of proposed land uses, traffic analyses, market analyses or cost analyses can take several weeks to complete. Perhaps more importantly, the opportunity to associate quantitatively measured performance with particular planning or design strategies is lost. Anticipating the transportation or environmental impacts of different density or street network designs would be instructive to a comparison of alternatives and different options might very well be pursued were that information available at the right time.

Four separate but linked tools make up the authors’ tool set, called the neighbourhoodsLAB tools. They merge visual and quantitative information and are available on-demand during the charrette process (Figure 3). The **Site Modeller** builds a GIS model of the diverse descriptors of a site to ensure

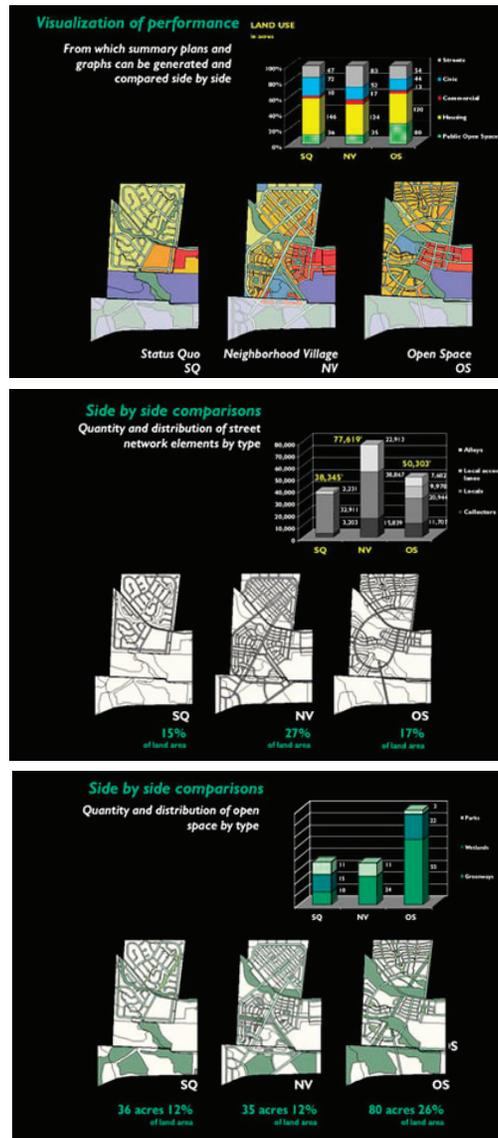
that all participants share and have equal access to site information and imagery. Included are quantitative, qualitative and visual information such as maps and air photos, explanatory diagrams, movies and pictures of key places and features. The **Elements of Neighbourhood** database (EoN) illustrates a lexicon of the design elements of a neighbourhood in seven categories of land use. Images, narrative and quantitative information cross-reference physical qualities and character to the words and numbers of planning and design. The **Scenario Modeller** brings site information and design alternatives together. Development alternatives are built by assigning selections from the Elements database to areas of the plan. The GIS application tracks and records how many of which elements are used. The **Reporting Tool** compiles quantitative data and reports evaluative measures about a design alternative or scenario. Background mathematical operations calculate crucial performance indicators for a particular scenario and summarize the results in a series of reports against which different scenarios can be compared (Kellett, 1997, 1998).

Access to useful, vivid, persuasive urban design information about building design and siting, streetscape and public space design, is a particularly acute and unmet need. Whereas many design professionals carry a familiar set of useful and instructive images and measures in their memory, most non-professionals do not. Photos and books are often used, but are not typically supported by quantitative information. Instructive examples of housing, commercial, civic and industrial land uses as well as parks and street systems supported with visual and numerical information would add immensely to a charrette. Opportunities for mis-communication can stem from the differing background, knowledge and preferences of workshop participants. Designers, by and large, communicate via diagram, plan, overlay and sketch. Engineers and planners communicate via numbers and diagrams. Other participants, particularly non-design professionals, may be engaged more by speaking, writing, demonstration or modeling. The challenge is to cultivate strategies that bridge this mix of communication and working styles. Strategies that cross-reference visual and quantitative dimensions are particularly useful. For example, an acre-grid superimposed over an airphoto provides a visual benchmark of scale and density.

The **Elements of Neighbourhood** (EoN) database meets this need for measured and visual design data derived from case studies (Figure 4). Cases within the database represent land uses—the streets, open spaces, housing, commercial, civic and industrial building blocks from which community plans are created. Approximately 200 ‘green’ and ‘status quo’ cases comprise the database, with more added to assist the needs of new projects. EoN, in and of itself, is an innovative design reference. Used as an educational tool, it brings instructive cases (of building types, for example) directly into a charrette (in digital, projected or print form). Additionally, when linked to a digitized model of an alternative plan, data associated with these same cases enable tools that measure and compare alternatives. This linkage represents a significant breakthrough for participatory design processes and unlocks tremendous opportunity to bring best available design precedents, science and modeling to local planning within a parallel timeframe.

**Figure 4:** Components of the Elements of Neighbourhood database: searchable roster of field measured cases within each land use category (figure 4a), diagrammatic site plan indicating principal elements and surfaces (figure 4b), aerial oblique 3-d view of site plan (figure 4c), and video or animated photograph sequence of case viewed from public domain (figure 4d). Source: neighbourhoodsLAB.





**Figure 5:** West Corvallis, Oregon, USA: Side by side comparison of three plan alternatives against measures of land use (figure 5a), street networks (figure 5b) and open space (figure 5c). Source: neighbourhoodsLAB.

Development of these tools has advanced through application and testing of segments in research, teaching and community service applications. Since 1996, we have worked with several communities in the state of Oregon, USA. More recently, we have completed one charrette-based project in British Columbia, Canada and are mid-way through a second. In this work, we have built digital models of existing conditions and proposed alternatives that can be viewed as conventional plans or maps or draped over 3-dimensional terrain models. The EoN database has been used to inform discussion of development density and built form and to provide data for comparative analyses of alternative plans under contemplation (Kellett, 1998; Girling & Kellett, 1999) (Figure 5).

## 6 Case 1: Design charrettes in Oregon, USA

Since the 1970's the state of Oregon in the United States has exercised significant state-level control over land use and land planning, unlike many other states. The state has instituted Urban Growth Boundaries, which limit the outward expansion of urban areas, and has required comprehensive growth planning since the 1980's. It has also mandated public participation in local level planning, and of 19 planning goals developed by the state that all municipalities must adhere to, citizen involvement is Goal 1. Much study has gone into effective methods of achieving public participation and, the public processes of community planning have shifted to more proactive and performance-based approaches to demonstrate, community-by-community and site-by-site, that land can be used more efficiently while maintaining quality of life. Citizens are now invited, and in Oregon are required, to advise on and participate in some of the more complex aspects of planning and development. Decisions about the size and density of developments, mixes of land uses, traffic impacts, and impacts on schools of development proposals and specific area plans are frequently included in participatory planning processes (Ames, 1998; Abbott et al., 1994; Oregon Citizen Involvement Advisory Committee, 1992).

The North Corvallis area planning process was initiated by the City of Corvallis in 2000 and concluded with the adoption of a specific area plan in 2002 (Satre Associates & neighbourhoodsLAB, 2001). With City staff support, a Citizens Advisory Committee (CAC) was appointed to direct the process including making significant decisions and guiding the consultants on the project. The entire planning process took 10 months, but the heart of the design component took place in a design charrette and follow-up public meetings mid-way through. The design charrette and public meetings followed this framework:

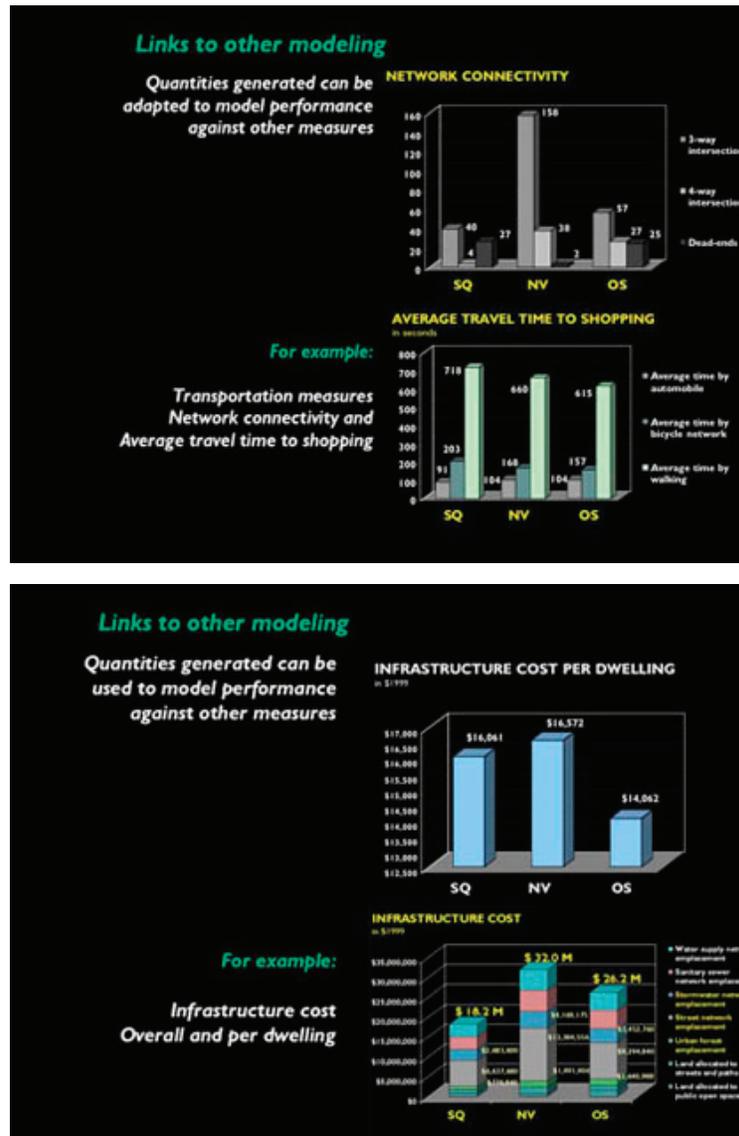
1. A public education session
2. A two-part workshop involving about 100 participants. Part one: groups of ten people discussed future visions for the site. Part two: 14 teams of eight created land use concepts and accompanying vision statements for the site.

3. Approximately two weeks later the consultant team came back to the CAC with the 14 visions documented and synthesized into six planning principles. The CAC recommended minor revisions to the principles and provided rough scenarios for development of three alternative plans.
4. Three alternative plans were developed from the 14 visions and the six planning principles. Visualizations and comparative measures were created using the neighbourhoodsLAB tools. These were presented to the larger public group, who extensively critiqued the three alternatives.
5. Referencing summaries of public input, the CAC gave direction to the consultants for development of a preferred alternative plan.
6. The preferred alternative was developed and measured, again using the neighbourhoodsLAB tools. Additionally the consultant team prepared a traffic analysis of the plan.
7. The preferred alternative plan and drafts of the report were reviewed by the CAC and the larger public group several times before the report was submitted to staff and eventually city council for adoption ([Satre Associates & neighbourhoodsLAB, 2001](#)).

The authors' tools were applied in steps four through six. In doing so, we were able to combine the digital models of a site and the alternative plans with data and illustrations from the EoN database to create more complex and measured models of proposed alternatives. Based on assignments of EoN cases to land use maps, each alternative plan was inventoried for summary land use data such as number of dwellings, densities, building coverage, paving coverage, forest, tree and turf cover, and so on. Using quantities generated by this method, many types of computations concerning land use, transportation, environmental impact, infrastructure and cost can be created and compared.

In this application, the neighbourhoodsLAB tools were able to provide visual and numerical evidence of the land use, environmental and economic performance of three different development patterns. These alternatives of similar size, land use mix and density measured very differently in terms of transportation, environmental impact and infrastructure cost ([Figure 6](#)). One alternative in particular demonstrated significantly better environmental performance at less infrastructure cost. It was based on ideas of preserving the streams and wetlands on the site and additionally of using natural stormwater management techniques to protect these resources. This was very attractive to the community and as a result, a "green infrastructure" approach was included as a significant policy in the final preferred alternative.

Two evaluations of this public involvement process were conducted. A city appointed Committee for Citizen Involvement (CCI) reviewed all public involvement processes in the city as mandated by state law. Additionally, a Masters of Community and Regional Planning student from the University of Oregon, Nicole Taddune, reviewed and evaluated the process for her Masters



**Figure 6:** West Corvallis, Oregon, USA: Using additional modeling, comparisons were made between three plans in Figure 5 to evaluate the transportation networks (figure 6a) and the overall costs of infrastructure (figure 6b). Similar comparisons were made by the consultant team for the North Corvallis Area Plan project. Source: neighbourhoodsLAB.

thesis (Taddune, 2002). Both evaluations were generally positive about the process. Citizens' values were well represented through the CAC and particularly thorough the CAC's vetting of the six planning principles. The process enabled a high degree of informed citizen power throughout the planning process and multiple conduits provided extensive two-way communication. The most significant critique was related to the mandate of the CAC as established by the city. CAC was not mandated to directly represent their constituencies, and a small minority of the over 300 people who participated felt that their opinions were not addressed by the CAC. However, Taddune concluded her analysis by stating, "Citizens had ample opportunities to advise while being provided with critical technical information helping them to make realistic and more informed suggestions and recommendations." (Taddune, 2002, pp. 57) Overall the process was found to be very collaborative and its success can be measured by the rapid adoption of the plan, backed by community support six months after the consultants' report was submitted. It was approved by the state government shortly thereafter.

## 7 Case 2: Squamish, British Columbia, Canada

Beginning in 2003 as a partnership between the Design Centre for Sustainability at UBC, Smart Growth BC, and the Real Estate Institute of British Columbia, the Smart Growth on the Ground (SGOG) initiative set out to address the dire need for sustainable and smart growth development in B.C.'s growth-pressured communities. SGOG has as its mission the commitment to see sustainable community design be implemented "on the ground." To this end, the partnership is committed to integrated and multidisciplinary research, planning and design that champions long-term sustainable community development. Such work represents a fundamental shift in planning and design processes from what is typically found in communities today, and a further goal of SGOG is to institutionalize such a change in planning processes in the communities it works with.

Squamish, B.C., is the second municipality to partner in the SGOG initiative. The Smart Growth on the Ground—Squamish project commenced in 2004, to address the specific issues of the Squamish community in its challenge to accommodate a significant increase in population and associated land and infrastructure requirements. The municipality was receiving development applications at an unprecedented rate, and was concerned about the ability of their current policies and processes to address specific concerns related to smart growth and sustainability issues. Of particular concern was Squamish's identity as the "Recreation Capital of Canada," and the risk posed to this identity and its economic value by the threat of uncontrolled development.

The integrated planning and design process of the SGOG project in Squamish unfolded over a seven month period, including extensive public consultation and culminating in a charrette event. Following this, the Concept Plan that reported the results of the charrette event was drafted, and the Plan was adopted by



**Figure 7:** The charrette team at work. Squamish, British Columbia, Canada, April 2005. Source: Design Centre for Sustainability

Squamish Municipal Council in October 2005 ([Design Centre for Sustainability, 2005](#)). In more detail, the public consultation and charrette process consisted of:

1. The Opening Forum was held in October 2004 to launch the project.
2. Public Workshops were held in November 2004, organized by stakeholder groups: business people, developers/property owners, residents, environmentalists, educators, community group representatives, and recreationists. Workshops established community priorities.
3. Other meetings/workshops were held with a variety of groups, to further establish community priorities. These groups included environmental regulators, transportation officials, economic development representatives, housing researchers, and the Squamish Nation. As well, workshops were held with the youth leadership classes at Don Ross Secondary and Howe Sound Secondary.
4. The Learning Event was held in February 2005, and brought together speakers on a range of issues to present leading edge innovation and research related to priority issues in Squamish.
5. A second round of Public Workshops, held in February 2005, were organized by stakeholder groups and focused on setting performance targets for priority areas.
6. The Charrette Event was held over four days in April 2005 ([Figure 7](#)). Organized over two weeks, charrette team members participated for two full days each week, in addition to the following public events: Charrette Kick Off, Charrette Mid-Course Review, and Charrette Presentation and Open House.
7. At the Charrette Kick Off, team members formally met each other and were introduced to the Design Brief (set of design instructions) and resources compiled for the team for use during the charrette.
8. At the charrette mid-course review, the charrette team presented their draft planning and design recommendations to the public. The community audience then split into the stakeholder groups (from the November and February workshops) and provided input and feedback to be considered by the charrette team's further work.
9. Over 100 people attended the Charrette Presentation and Open House. The charrette team presented the work that had evolved over the course of the charrette event.

It was intended that the decision support tools—EoN database, and CommunityViz—would assist the charrette team by measuring the results of design decisions at the mid-point of the charrette process. Prior to the charrette, cases



**Figure 8:** A “drape” of the charrette-generated land use plan over a 3D landscape model. Source: Natural Resources Canada, Earth Sciences Division, Vancouver, Canada.

from EoN were selected for use during the charrette, to aid the charrette team in discussions of site design and building form, primarily. Squamish-specific cases were also developed and added to the database where it was identified that the EoN database did not contain a relevant case. These case examples were available to the charrette team during the event. Also prior to the charrette, a CommunityViz model was developed by partner researchers at Natural Resources Canada. The model consisted of a three-dimensional terrain model with orthographic overlay, as well as a two-dimensional planometric model to measure surface-cost distances. These surface-cost distances were the means to measure the factors/indicators described further below.

However, at the mid-point of the charrette—through a combination of short timeframe, an untested CommunityViz model, and vague preliminary charrette results—the charrette organizers chose to forgo the decision-support tools at this stage of the process. Instead, at the end of the charrette and through the following months as the Concept Plan was drafted, these tools provided a mechanism to support the charrette’s findings through visualization, measurement, and to rationalize particular details of the Concept Plan.

CommunityViz was the first of the tools to communicate results of the charrette. During the presentation of the charrette results, Scenario 360 (a CommunityViz application) was used to take the public audience on a ‘fly-through’ of the Squamish landscape. A digital photo of the final plan drawing to emerge from the charrette was draped over a digital model built in CommunityViz, al-

lowing the audience to view the preferred future alternative for the area within the larger context of dramatic topographic variation, identifiable landmarks, and natural landscape. The visualization detailed the locations of land uses and development footprints within this context, and lent support to the preferred alternative scenario for the Squamish study area (Figure 8).

Following the charrette, CommunityViz was further used to measure the preferred alternative against the existing conditions of the Squamish study area. Research had been conducted prior to the charrette to measure and document the “baseline” or existing conditions of a variety of factors in the study area such as housing densities, accessibility to transit and services, canopy cover, etc. These factors were identified through the public process and through supporting research by the authors. They were also selected because of their correlation to sustainability and smart growth principles, and applicability to Squamish. These indicators of sustainable development were measured in both the baseline condition and the future scenario that emerged from the charrette process. Thus, it was possible to compare the existing Squamish condition to a proposed, alternative future condition along a number of relevant indicators. The comparison demonstrated a high level of positive scores for the proposed alternative future on those factors that were important to the community and indicative of sustainable performance.

EoN was employed during the reporting phase of the project, to assist in the writing of the Concept Plan. EoN allowed for a greater fine-tuning of the charrette results that moved the results from a “vision” to a much more detailed planning/policy document. By applying cases from the database to the charrette-generated land use plan, the authors were able to spatially account for the proposed future population densities, and to outline the specifics of permitted uses, intensity, lot size, building type, number of stories, orientation, open space, parking and setbacks recommended for each land use. This level of detail allowed the authors to rationalize the proposed land use with the demographic and economic research and targets compiled for the charrette team and spatially detailed in the Concept Plan. Upon completion of the Concept Plan, it was presented to Squamish Council and was approved in October 2005 ([Design Centre for Sustainability, 2005](#)). The municipality is currently using the Plan to inform its planning work.

## 8 New directions

Planning for new and infill development plays a critical role in shaping the future of Canadian communities. Increasing the sustainability of the models and methods that shape that development can be an effective ‘agent of change’. Achieving more sustainable models of community planning, requires that the planning and decision making process carefully balance and integrate responses to many competing forces and issues representing the interests of many and diverse stakeholders. Collaborative models of design, and design charrettes in particular, offer much opportunity for bringing diverse interest and stakehold-

ers together to negotiate that balance and integration. How sustainability is represented in those processes is critical.

How can communities set goals for sustainability and measure progress toward them as they plan and design for future development?

Setting targets and establishing indicators for measuring progress are tools we have recently added to the charrette process. Over the past three years the Design Centre for Sustainability at UBC has developed and applied various kinds of indicators in design charrettes. Many indicators measure familiar planning and urban design performance parameters, such as housing densities, housing mixes, commercial area and intensity, accessibility of the street network and pervious vs. impervious land cover. We develop and calibrate these indicators in consultation with communities, articulate them in a design brief that establishes the framework for the charrette process, and use them to evaluate alternatives generated in the charrette. They also offer a means to guide implementation ‘after the charrette.’ Indicators directly engage issues of sustainability, and some additionally engage issues pertinent to the specific project community. All indicators are explicitly tied to, and measurable in, the physical and visual products of design.

These tools support design charrettes and other community based planning processes by facilitating measurement and visualization of alternative planning and urban and design scenarios. While clearly still in development, these tools have improved significantly in a very short period of time. A charrette generated planning alternative can now be measured, modeled and visualized in 3-D in parallel and in roughly the same time frame as alternative plans are generated at the charrette. The opportunity afforded is significant. With tools such as these it is possible to equitably compare alternative plans through visualization and measurement of their relative performance against locally derived indicators of sustainability using the very schematic design descriptions and information customary to a charrette-based planning process. That integration of sustainability with other indicators brings it closer to full and equitable consideration in participatory community planning and design. These processes and tools help to close gaps in method and knowledge in decision-making processes in order to connect public opinion and government policies to ‘on the ground’ physical planning and implementation of more sustainable neighbourhoods.

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