VISUALIZATION IN SUPPORT OF PUBLIC PARTICIPATION

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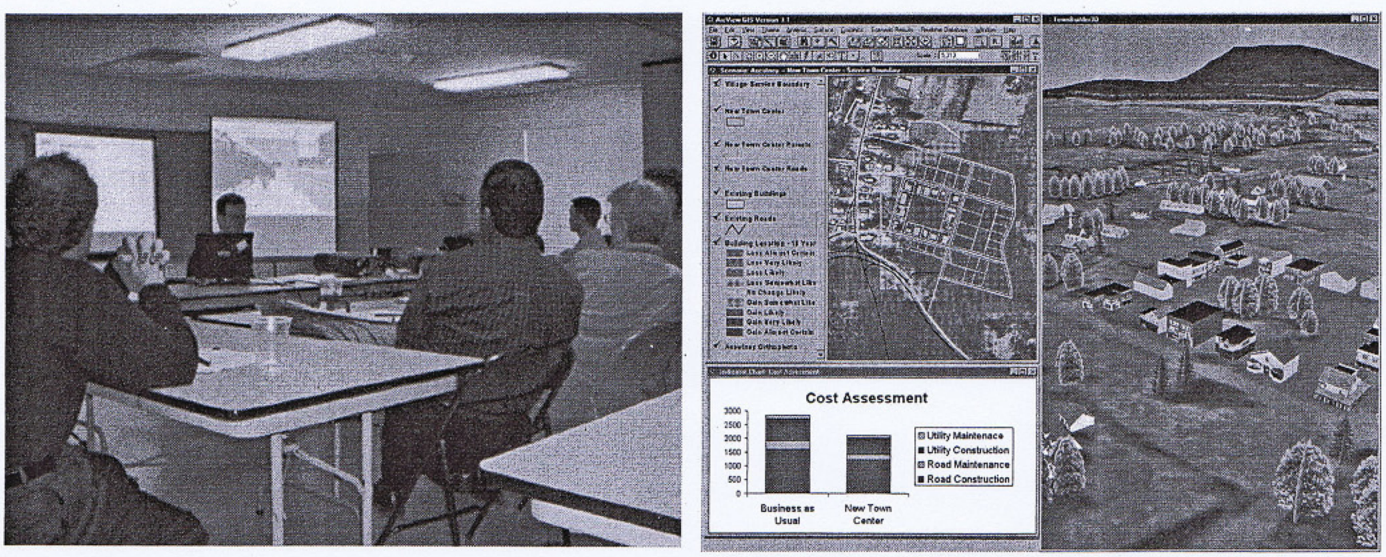
Introduction

Our underlying assumption is that there will be growth, with development pressures on greenfields, typically undeveloped or agricultural land. The impetus to look for improved planning methods is a result of, and negative reaction to, current development practice. In Baltimore, for example, we have seen automobile-based planning manifesting itself in traffic jams, chaotic development patterns and the loss of open space.

Each planning situation is different in scale, landscape, degree of anticipated change, governmental and regulatory structures, and the nature of public participation. The integration of simulations and visualizations into the public participation process, to facilitate informed discussion and decision making, can be guided by the people involved, propinquity and localism. We have used technology consistently to develop plans in a variety of settings from hands-on workshops to large 'town hall' meetings (Figure 10.15). In our work, the technology was integrated into the process and used at the front-end to help formulate goals and the vision. Public expectations about the use of the



10.15 Systems for public participation: (left) scene from a hands-on workshop with Steering Group in Santa Fe; (right) software for option evaluation combining mapping, three-dimensional views and outcome summaries visual simulations, on the other hand, have typically been limited to use at the back-end to sell the plan.

Our recent studies have commonalities that are useful for comparing why, how and under what circumstances visual simulations were used to enhance public participation and decision making. Conceptually, they share a common base in visioning. Visioning is a citizen-driven process where the results are derived from public input. Its purpose is to reach consensus on issues regarding values and group identity. The process is inclusive, neither top-down nor bottom-up, and includes stakeholders (from business leaders to NGOs) and the public sector.

Place plays a critical role in locating common ground. As Donald Appelyard (1979: 143) observed: 'technical planning and environmental decisions are not only value based … but identity based'. From the perspective of the lay public, place (a neighbourhood, town, city or region) is experienced as a whole. The quality of place, the combination of its experiential and functional attributes and group values and identity, is fundamental to visioning. Visioning uses physical design as a form of inquiry, exploring the match and mismatch between words and images; abstractions that have very specific real world implications. In this process, it is not unusual to hear the shock of 'that's not what I meant at all' when words and numbers in a standard master plan or zoning resolution are simulated and visualized dynamically in three dimensions. The visual simulations used in visioning play a similar role; grounding metaphor in reality.

Baltimore: Vision 2030 – shaping our region's future together

Over a 15-month period, the Vision 2030 public Thematic Committees explored six thematic areas that are brought together to form a regional perspective (Baltimore Regional Transportation Board, 2003). The areas were:

- economic development;
- education;
- environment;
- government and public policy;
- liveable communities; and
- transportation.

The visioning process involved six interrelated and sequential steps:

- Step One: understanding the region – perception and reality.
- Step Two: involving stakeholders (the Regional Workshop).
- Step Three: prototypical development patterns and scenarios.

Table 10.1 The tools used and applications developed to seamlessly integrate words, numbers, maps and images in a real-time three-dimensional environment

ArcView GIS	Geographic Information System (GIS) developed by Environmental Systems Research Institute (ESRI) and includes 3D Analyst and Spatial Analyst
CommunityViz	Suite of ArcView based decision support software designed by the ESC for the Orton Family Foundation that includes: a 'scenario constructor' module for developing alternative scenarios and assessing their impacts; a 'policy simulator' module to predict possible futures; and an interactive 3D three-dimensional module where alternative scenarios can be designed and visualized and where citizens can change the scenarios in real time.
Creator	3D Three-dimensional modelling and authoring software for real-time simulation and visualization developed by Multi-Gen Paradigm;
TerraTool	Parametric modelling software for real-time viewing developed by TerraSim, Inc.

- Step Four: gathering ideas and testing results with the public (the Regional Public Meetings).
- Step Five: developing vision statements and strategies.
- Step Six: testing the vision statements and strategies with the public.

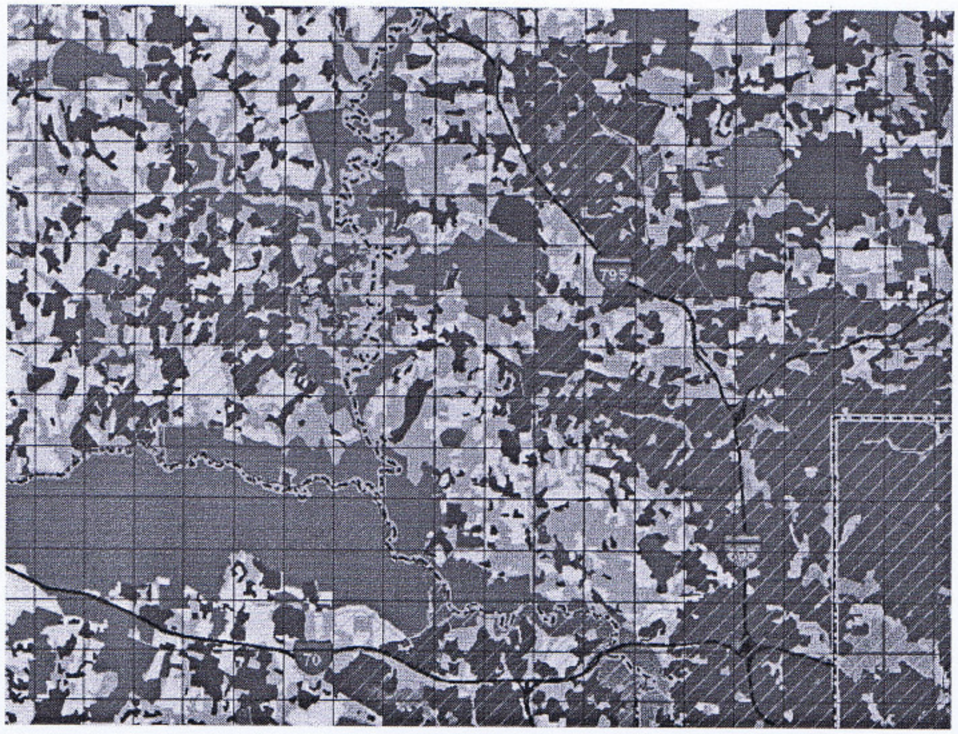
In the Vision 2030 process, visual simulation played a central role in helping the public and the Thematic Committees reach consensus on the 'hot button' issue of where and how to accommodate growth in the region identified by the focus groups in Step One. The software used in the workshops is introduced in Table 10.1.

The Regional Workshop ('where to grow')

In response to the 'hot button' growth issue, the Regional Workshop focused on 'where to grow'. Organized as a game, the purpose of the workshop was threefold: to understand the complexity of thinking regionally; to gain 'intuitive' public input on future growth and land consumption considerations; and to prepare for future subcommittee work (e.g. developing the vision statements, strategies, and principles that formed the core of Vision 2030).

The participants included 65 stakeholders: elected officials, planners, educators, citizen activists, staff from NGOs, and business leaders. Participants were evenly divided into eight groups, each with a facilitator.

Participants agreed on a percentage (average of all eight groups) of the region's land they wanted to protect over 30 years, in addition to land already protected. The next step was to agree on a common set of criteria, weighted differently by each of the eight groups, used to select the areas to protect (e.g. creation of contiguous natural environments, protecting forest and trail areas, etc.).



10.16 Detail of map of the Baltimore Region with mile square grid and GIS coverages

A large GIS-generated map of the region, which included layers delineating urbanized areas, protected areas, and agricultural and other unprotected land, was overlaid by a 2.56 km^2 (1 $mile^2$) grid (Figure 10.16). Each group was given green 'chips', each representing 1 grid square of land and asked to place them onto areas that the group believed should be protected. The results of each group's approach to future land protection were tabulated and workshop average calculated. The patterns of chip placement were compared and discussed by the workshop participants, revealing an underlying consistency in the choices.

The next step was to locate growth. The groups were given brown 'chips' that represented the amount of land that would be needed to accommodate the region's projected growth for the next 25 years. The participants agreed on criteria to guide their decision making for allocating growth (e.g. along transit lines in already developed areas, in undeveloped areas, near employment centres, etc.). The emerging consensus was to locate growth in the region's developed areas and protect undeveloped and agricultural land.

The Regional Public Meetings ('how to grow')

Over a two-month period, 17 facilitated Regional Public Meetings were held. Presentations were made of prototypical development patterns, region-wide development scenarios, and the absolute and relative performance of the development scenarios, questionnaires administered, and small group idea sessions were conducted.

The Thematic Subcommittees identified three development patterns, and four future regional development scenarios whose relative performance would be evaluated by agreed indictors. The development patterns were modelled in three dimensions as building blocks. Each scenario showed how the region would develop depending on the allocation of the development patterns.

The three development patterns reflected trends occurring in the Baltimore region as well as nationwide. Each had different implications for land consumption, mix of housing types and proximity to jobs, shopping and entertainment. They were as follows.

- Type A: Conventional development pattern in undeveloped land. It reflects a continuation of how the region has been growing with single family detached houses, and shopping, entertainment and employment in auto-centred malls (Figure 10.17(a)).
- Type B: Mixed-use walkable community on undeveloped land. It assumes the creation of more compact neighbourhoods with a mix of housing types with shopping, entertainment and employment nearby (Figure 10.17(b)).
- Type C: Mixed-use walkable communities on redeveloped land. It also assumes the creation of more walkable compact communities but on redeveloped land (Figure 10.17(c)).

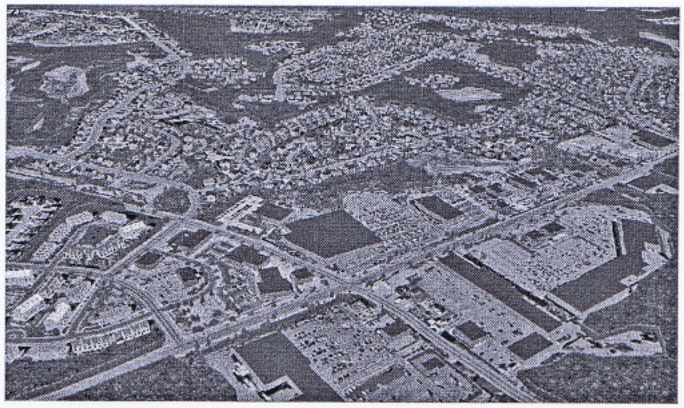
Each building block or development pattern had the same brief or programme; accommodate 1000 households – with supporting commercial resources, schools and open space. This allowed for 'apples-to-apples' comparisons.

Vision 2030 was not focused on a particular place in the Baltimore region but rather on characteristic areas in the region. Given the region's emphasis on the local control land-use regulation), it was critical that Vision 2030 not appear to be usurping local authority (Figure 10.18). Working collaboratively with Thematic Subcommittees, two representative places were composited using the five county GIS orthophotographs and database; one with large tracts of undeveloped land and existing suburban and rural development patterns with the possibility of 'greenfields' development and the other an urbanized centre with the possibility of infill redevelopment.

Using the briefs, prototypical building types and development patterns were designed (layout of blocks, lots, streets, uses, open spaces, distribution of building types, etc.) modelled in three dimensions and inserted into the 3D/GIS. The real-time 3D/GIS environment allowed for an efficient confidence building process where the Thematic Subcommittees viewed patterns dynamically, commented on the design of the development pattern, iteratively refined it and selected views and real-time walk-through paths to be presented at the 17 Regional Public Meetings.

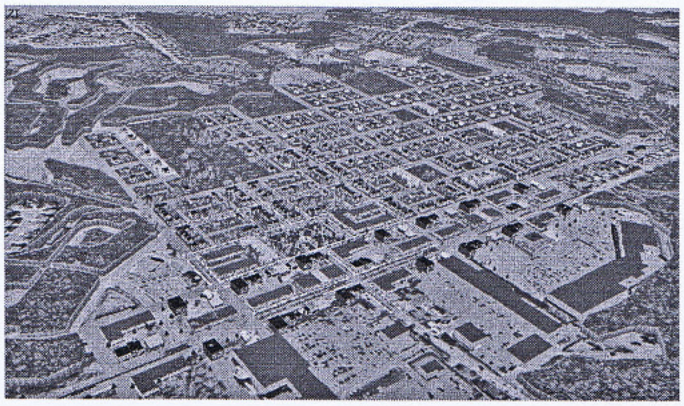
The three-dimensional visual simulations of the three development patterns were then assembled into the four regional development scenarios:

10.17 (a) Conventional development 1990–99 trends in the region; (b) mixed use – greenfield development; (c) mixed use – redevelopment



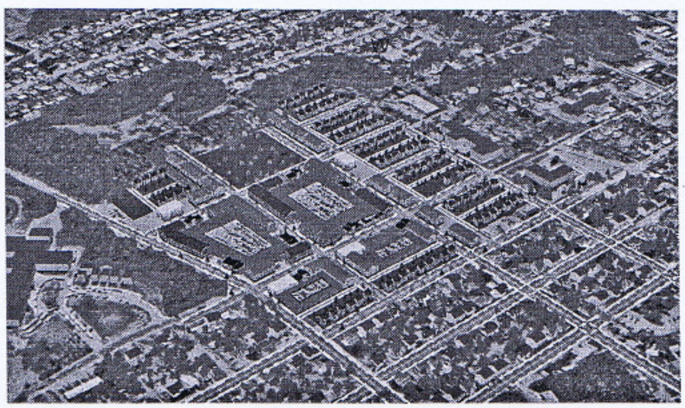
a

Households	1000
Jobs	1092
Residential	245 ha
Institutional	39 ha
Commercial	20 ha



b

Households	1000
Jobs	1092
Residential	63 ha
Institutional	39 ha
Commercial	10 ha



c

Households	1000
Jobs	1092
Residential	52 ha
Institutional	32 ha
Commercial	8 ha

1 current trends and plans;
2 emphasis on road capacity;
3 emphasis on mass transit; and
4 emphasis on redevelopment.

The scenarios accommodated the forecasted population and employment growth for the region by using the development pattern types in different combinations. The compositing of development pattern types or building blocks into scenarios is illustrated by comparing the mix of development types between scenario 2 and scenario 3 (Table 10.2).

10.18 'Greenfields' composite area

Table 10.2 Two of the Baltimore region development scenarios

Scenario 2 Emphasis on road capacity	
Type A: Conventional development pattern on undeveloped land	75%
Type B: Mixed-use walkable communities on undeveloped land	20%
Type C: Mixed-use walkable communities on redeveloped land	5%
Scenario 3 Emphasis on mass transit	
Type A: Conventional development pattern on undeveloped land	25.0%
Type B: Mixed-use walkable communities on undeveloped land	37.5%
Type C: Mixed-use walkable communities on redeveloped land	37.5%

The comparison of the four scenarios was measured through a computer model that used ten indicators to measure the performance of each scenario. They included, for example, acres of new land consumed by development from the year 2000 to the year 2030, percentage of new neighbourhoods that provide choice of housing types and range of prices, air pollution from vehicles, impact of existing and future development on existing water quality in Chesapeake Bay, and percentage of new jobs accessible by transit. The data used by the computer model came directly from the 3D/GIS visual simulations of the development pattern types.

10.19 Eye-level walk throughs: (left) existing condition; (right) redevelopment (images reproduced in the colour plate section)

The three development patterns, the four regional development scenarios, and each scenarios' performance were presented at each of the 17 Regional Public Meetings in conjunction with a questionnaire entitled 'Choices for the Future'.

The scenarios and performance indicators represent 'what ifs', hypothetical situations that were intentionally designed to offer a wide range of choices. Their abstraction, particularly when expanded to the five county region, was made palpable by the visual simulations that employed three-dimensional models and eye-level walk-throughs (Figure 10.19). They communicated to the public 'if you think or prefer this, this is probably the kind of place that will result, and is it acceptable?' The visual simulations were compelling and, in conjunction with the performance evaluation of each scenario, provided a comfort level for respondents to the 'Choices for the Future' questionnaire to overwhelmingly support the redevelopment and emphasis on mass transit scenarios, both of which consumed less than half the amount of land in comparison with scenario 1 – current trends.

The way in which visual simulations were used in Vision 2030 was a function of the scale of community participation process in the region. The Thematic Committees were hands-on using the real-time environment provided by the 3D/GIS. Similarly, the Regional Workshop allowed for direct interaction with the 3D/GIS and the visual simulations. The results of the 'where to grow' and 'how to grow' workshops were presented at the 17 Regional Public Meetings which, due to the large number of participants, could not be hands-on in terms of determining or even changing the content. Rather, the Regional Public Meetings were designed to elicit community response to a series of scenarios. The public outreach and communications effort, the visual simulations, the indicators used to evaluate the performance of the development patterns and scenarios, and the iterative nature of the process were very effective in keeping people informed and involved and in communicating the ideas developed in the committees and Regional Workshops. Telephone interviews of 1200 randomly selected participants carried out at the end of the visioning process validated the positions taken by Vision 2030.

Conclusion

Because people experience the world in three dimensions, in time, and in motion, digital technologies that mimic human experience are most easily understood and accepted by the public during the planning process. The tools used were able to seamlessly integrate words, numbers, maps and images in a real-time three-dimensional environment supporting place-based planning. They supported public participation in the development, review and refinement of the three-dimensional building blocks and the compositing of alternative scenarios. They also built public confidence in the visual simulations as a result of being able to use the 3D/GIS interactively, and the performance evaluation of 'what if' scenarios.

A clear example of this emerged in a case study based in Santa Fe, NM. Consensus was reached on a housing density of over 12 DUs/ha (5 DUs/acre) or almost twice the current zoned density. The real-time 3D/GIS models went beyond abstractions such as FAR (Floor:Area Ratio – a poor indicator of density and/or intensity of use found in most zoning regulations) providing both the quantitative effects of sprawl and urban densities on land consumption and the experiential basis to discuss in concrete terms the kind of place the residents and stakeholders wanted. Without having first developed the vision for South-west Santa Fe through simulation and visualization, it is highly unlikely that the community would have considered doubling the density, far less supported it.

Visual simulations support both deductive and inductive reasoning (analysis/synthesis) when their applications are fully integrated with the design of the planning process. Real-time 3D/GIS was critical in supporting a planning process that was engaging, informative and ultimately instrumental in helping communities to reach consensus about their future.

Acknowledgements

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