



Box City. Photo: CUBE

Appendix

Comprehensive List of Tools by Category

Many of the following sections are excerpted from *Tools for Community Design and Decision Making*, by Ken Snyder.

Traditional Methods by Hand

Miniature Modeling

Box City, developed by Ginny Graves at CUBE ([HTTP://WWW.CUBEKC.ORG](http://www.cubekc.org)), is a simple technique of using basic art supplies (cardboard boxes, construction paper, markers, etc.) to create a small replica of a city block or street corridor. Because it is low-tech, people of all ages can easily engage in an exercise identifying the things they value the most in their community and things they would like to see changed. The Hackney Building Exploratory ([HTTP://WWW.BUILDINGEXPLORATORY.ORG.UK](http://www.buildingexploratory.org.uk)) in the township of Hackney (located within the greater metropolitan area of London), has used similar techniques very effectively to educate children and adults about the built environment they live in and how historical, environmental, and political issues have helped shape their community over the years. Exhibits range from high-tech computer programs developed in partnership with the Centre for Advanced Spatial Analysis (University College

London) and the Housing Corporation to illuminated models, kits, maps, games, and giant jigsaws made by professional artists working with local children and adults.

Photomontage

Several TCDDM participants, including Dover and Kohl ([HTTP://WWW.DOVERKOHL.COM](http://www.doverkohl.com)), Duany Plater-Zyberk and Company ([HTTP://WWW.DPZ.COM](http://www.dpz.com)), Urban Advantage ([HTTP://WWW.STEVEPRICE.COM](http://www.steveprice.com)), and Winston Associates ([HTTP://WWW.WINSTONASSOCIATES.COM](http://www.winstonassociates.com)), demonstrated the use of photomontage and computer imaging techniques to assist communities in visualization. A **photomontage** involves taking a digital image of an existing streetscape or building development and “doctoring” the image to add design features such as decorative street lights, trees, grass medians, light rail, bike lanes, and mixed-use with retail on the first floor and office space and housing above. It allows planners and interested citizens to see how an existing

streetscape might be improved or give people a better sense of the type of development they would like see occur in the future. It is particularly useful for showing incremental change, such as first adding a median, then street trees, then infill with buildings, etc. This technique can also help shift discussions away from density and more towards design and functionality.

Visual Preference Surveys

Interactive Visioning Surveys

([HTTP://WWW.LRK.COM/HOMEPLANS](http://www.lrk.com/homeplans)), developed by Looney Ricks Kiss (LRK) of Princeton, New Jersey, can be disseminated throughout a community at computer terminals or on a Website to obtain widespread feedback. The kiosk-type survey asks a question and presents graphic images from which users select their preferred choice. The images can focus on aspects of streetscapes or any other design topics the local government wants input on. In Hillsborough, New Jersey, this kiosk technique enabled the town to get feedback from nearly 10 percent of its residents. The kiosk helped users visualize various street improvements (buried utility lines, wider pedestrian sidewalks, decorative lighting, etc.) and what they might look like integrated into an existing streetscape. Respondents were asked to select their overall favorite and then indicate how much they would be willing to pay in taxes to implement the design they chose.

Visual Preference Surveys

([HTTP://WWW.ANAVISION.COM](http://www.anavision.com)), developed by Tony Nelessen, use color slides and simulations that enable the viewer to compare, contrast, and select among images. Audience members provide feedback on each image, ranging from -10 for something they really dislike to +10 for something they'd love to see in their community. Using the previously described photomontage technique, Nelessen Associates works to eliminate biases created by things like the weather, keeping the same background sky and basic streetscape but adding those amenities they want participants to rank.

Impact Analysis and Economic Forecasting

CommunityViz

CommunityViz™ ([HTTP://WWW.COMMUNITYVIZ.COM](http://www.communityviz.com)) is a newly available suite of software planning tools that run on the ESRI ArcView/Spatial Analyst GIS platform. CommunityVizō was developed by the Orton Family Foundation with technical help from ForeSite Consulting, MultiGen Paradigm, Green Mountain Consulting, PriceWaterCooper, and the Environmental Simulation Center. The suite is comprised of three tools: a Scenario Constructor, which enables users to conduct impact analysis of different development options; the 3D Town Builder, which allows communities to create a replica of their community and fly through it like a flight simulator; and the Policy Simulator, which enables users to predict how people respond to different policy options using agent-based modeling techniques. One of the strengths of this suite of tools is that each is integrated with the other. This makes it possible for planners to add to new buildings within the 3-D TownBuilder, for example, and then immediately see the impacts of these choices in the Scenario Constructor. Similarly, the 3-D Town Builder can be used to show how development might look as a result of population shifts due to policy changes.

INDEX®

INDEX® ([HTTP://WWW.CRIT.COM](http://www.crit.com)) is a GIS-based planning support system that uses indicators to measure the attributes and performance of community plans. It is marketed in both standard and custom versions to professional planners and community organizations as a support tool for three key functions in community development: 1) creating plans through issues identification, alternatives analysis, and goal-setting, 2) implementing adopted plans by evaluating proposed development consistency with official goals, and 3) achieving plans by periodically measuring cumulative progress toward goals. At its heart is a set of

stakeholder-selected indicators that numerically and spatially gauge conditions and proposals. The software's analytical scope encompasses land-use, transportation, and environmental resources, and temporally it can perform static impact or dynamic forecast analyses of up to 20 years. The spatial resolution of its indicator scoring can be set at the block, parcel, or building footprint levels.

PLACE³S

PLACE³S, an acronym for PLANNING for Community Energy, Economic and Environmental Sustainability ([HTTP://WWW.ENERGY.CA.GOV/PLACES](http://www.energy.ca.gov/places)), is a land use and urban design method created specifically to help communities understand how their growth and development decisions can contribute to improved sustainability. PLACE³S has been developed in partnership with the California Energy Commission the U.S. Department of Energy, Parsons Brinckerhoff, Fregonese/Calthorpe, and Space Imaging Services. There are three main components to the PLACE³S approach: 1) Public participation – a fully engaged, comprehensive group of stakeholders committed to the principles of sustainability and collaborative planning; 2) Planning and design – a clear set of principles that embody a community's values and vision of what greater resource efficiency and sustainability mean to its future; and 3) Measurement – quantitative documentation of energy, economic, and environmental impacts to support informed planning choices and monitor plans as they are implemented.

QUEST™

QUEST™ ([HTTP://WWW.ENVISIONTOOLS.COM](http://www.envisiontools.com)) was developed by the Sustainable Development Research Institute at University of British Columbia and its spin-off consulting firm, Envision Sustainability Tools Inc. QUEST™ facilitates debate and discussion among a variety of stakeholders about regional sustainability. It allows users to actively explore different possible scenarios of the future for their

region and evaluate the social, economic, and environmental consequences of each. The tool can be custom-built for any region, and used by expert and non-expert audiences alike. QUESTô is being used on a number of projects around the world including with the Georgia Basin Futures Project ([HTTP://WWW.BASINFUTURES.NET](http://www.basinfutures.net)), which is looking at the coastal watershed that encompasses Vancouver, Victoria, and the Strait of Georgia. The goal is to further develop and improve this interactive approach to model development, public consultation, and policy development.

What If?™

What If?™ ([HTTP://WWW.WHAT-IF-PSS.COM](http://www.what-if-pss.com)) is a GIS-based system that can be used to explore alternative community development scenarios and project future land use patterns and associated population, housing, and employment trends. It allows public officials and private citizens to examine the likely impacts of alternative policies for controlling urban growth, preserving agricultural land, or expanding public infrastructure in easy-to-understand maps and tables. It is designed to be used by non-technical people in public forums, allowing communities to use currently available GIS information to support community-based dialogue and collaborative decision-making. What If?ô can be used to conduct a land suitability analysis, project future land use demand, prepare a land use plan, and allocate this demand to suitable locations.

Web-Based Tools

Web-Based Calculators

Airhead ([HTTP://WWW.AIRHEAD.ORG](http://www.airhead.org)), a project of the Center for Neighborhood Technology, is designed to help people reduce the air pollution impacts of their daily activities. The website includes an emissions calculator that helps identify and track the air pollution created by people's activities, and a

product search that shows the relative air pollution impacts of a variety of consumer products. The **ICLEI Commuter Calculator** ([HTTP://WWW.ICLEI.ORG/GAMES/COMCALC.HTM](http://www.iclei.org/games/comcalc.htm)) helps illustrate the potential shifts in greenhouse gas emissions as a result of different commuter options.

U.S. Department of Housing and Urban Development's EGIS

The U.S. Department of Housing and Urban Development's Enterprise Geographic Information System (EGIS) ([HTTP://HUD.ESRI.COM/EGIS](http://hud.esri.com/egis)) provides location, type, and performance of HUD-funded activities in every neighborhood across the country, as well as a selection of EPA information on brownfields, hazardous wastes, air pollution, and wastewater discharges. In addition, it is capable of conducting map analysis over an ArcIMS platform. The interactive components of EGIS will be released in phases over the next several years. As new technology and additional data sets become available, the EGIS will be upgraded and extended. At the time of this writing, the first phase of EGIS was rolled out to the public. The EGIS will contain many of the HUD data sets as well as data sets from other federal agencies, including EPA, Census, and FEMA flood plain data. Users will be able to import their own data for analysis.

GIS

GIS stands for Geographic Information Systems. It is a place-based mapping software that provides "data visualization, query, analysis, and integration capabilities along with the ability to create and edit geographic data." GIS is widely used in city governments across the country. Using digital mapping capabilities, tabular information, and other data gathered about a community, local assets such as historic sites can be identified and easily managed on a two-dimensional digital map.

With multiple layers of information that can be turned on and off, these assets, for instance, could then be shown and queried on the same map with neighborhood demographics or potential growth patterns. By visualizing a combination of different spatial information, proposed site alterations could be easily identified, located, queried, and managed in the context of the existing conditions. Beyond asset mapping, a GIS analysis could be done on the sustainability of development over time, thereby identifying the environmental impacts, infrastructure, and economic thresholds of a place.

ArcView GIS

The most widely used GIS software package for planning applications in local government is ArcView GIS™, developed and sold by a company called ESRI.

- ArcView runs on standard desktop PCs and has become a GIS standard for planners as well as other professionals requiring spatial information and data in an easily accessible, retrievable, and organized way.
- Using customizable tables and diagrams, a range of information to manage historical buildings, for example, can be created to query specific building information or look at patterns/relationships in a region. Planning information is categorized and organized into a database and linked to a GIS environment to understand and query spatial relationships.

[HTTP://WWW.ESRI.COM](http://www.esri.com)

ArcIMS

The GIS system is also accessible in a web-based environment, called ArcIMS. Residents of a community can, for example, look at spatial information about their neighborhood simply by clicking into this interactive web interface and uncover specific planning information about their place.

[HTTP://WWW.ESRI.COM](http://www.esri.com)

3D Animation

Much like watching television, an animation tool, such as 3D Animation/Modelling by AutoDesk, plays back a prerecorded walk-through of a place to an audience, who has no control where he/she is going in the model environment. Such a model is often highly realistic and detailed (like what you would see in animated features) and requires a lot of pre-processing time from the computer. Therefore, the viewpoints and paths of movement in the playback have to be pre-determined and pre-rendered (pre-processed) on the computer before it can be played back. Animation software typically come in one package where tools for 3D modeling and effects creation are combined with a playback tool.

AutoDesk VIZ

(formerly 3D Studio Viz)

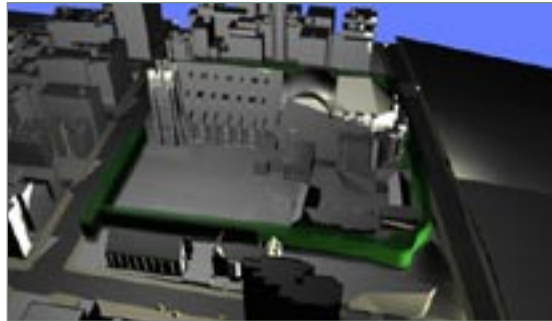
AutoDesk VIZ is a 3D animation software.

- Create highly detailed and realistic 3D models for animations.
- Visualize design alternatives from predefined views and pre-recorded paths/walk-throughs but no real-time interaction.
- Show lighting and shadow impacts.
- Visualize Photorealistic or Massing studies in context.

[HTTP://USA.AUTODESK.COM](http://usa.autodesk.com)

3D Realtime

More like a video game, real-time software, such as VIO by ITSpatial, enables a fully interactive, three-dimensional environment, allowing an audience/user to walk or fly to any location in the 3D model. Though still relatively realistic using photographs, a real-time model is typically less detailed than a 3D model created from animation tools. Furthermore, unlike animation software, real-time tools can be dynamically linked to a GIS database in a workshop setting. A realtime 3D environment is typically divided into two tools: 1) the 3D real-



AutoDesk VIZ. Image: Environmental Simulation Center

time modeler that allows a user to build/create the environment, and 2) the 3D run-time or viewer which is the game engine that allows a user to fly, walk, and query the environment in real-time.

Creator

A 3D modeler that is optimized for real-time interaction. It runs on a desktop PC and requires a reasonable amount of training. Adobe Photoshop and a digital camera are also needed to make the 3D models photo-realistic.

- Create real-time 3D massing models using simple geometry.
- Make the models photo-real through the use of textures (actual photographs of the place).

[HTTP://WWW.MULTIGEN.COM](http://www.multigen.com)

VIO (3D runtime or viewer)

- Experience the 3D model from any vantage point.
- Switch design alternatives in real-time.
- See photo-realistic or massing studies in context.
- Save predefined viewpoints anywhere in the model and bring them up.
- Save pre-recorded paths/walk-throughs and play them back.

[HTTP://WWW.MULTIGEN.COM](http://www.multigen.com) or

[HTTP://WWW.ITSPATIAL.COM](http://www.itspatial.com)

3D GIS

3D GIS software combines the power of 3D realtime simulation, GIS software, and database software to create a 2D/3D interface that integrates words, numbers, and images used to measure or represent impact. The different 3D GIS packages currently available (3D Analyst by ESRI, VIO-GIS by ItsSpatial, Sitebuilder by MultiGen-Paradigm, CommunityViz by the Orton Family Foundation) offer different levels of communication and dynamic links between the 2D GIS and the 3D real-time environments. A user can start in the GIS mapping environment to query or analyze the impacts of development in a historic district and then immediately experience these impacts visually in 3D. Similarly, the user can begin in the 3D and select buildings, which immediately trigger the 2D GIS to show information, such as construction type, zoning classification, historic designation, owner, etc., about the selected buildings. Rather than using the GIS and the 3D software separately, these 3D GIS packages offer more direct communication between them for a more cohesive study or analysis.



VIO. Image: Environmental Simulation Center

3D Analyst

A complementary tool to ArcView GIS that creates a 3D massing model of a place directly from GIS information for analysis in both 2D and 3D. There is, however, no dynamic real-time link currently.

- Creates a 3D terrain model from geographic information
- Creates 3D massing models of buildings directly from GIS data.
- Allows zooming and panning capabilities in the interactive viewer but no real-time flight or walk-through interaction, and no real-time link to GIS database.

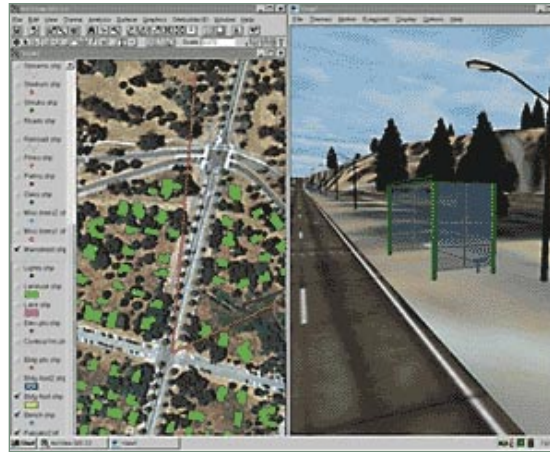
[HTTP://WWW.ESRI.COM](http://www.esri.com)

SiteBuilder

Sitebuilder can quickly generate a 3D model of a place from GIS data. Though not as realistic as Creator and VIO, it allows for very quick visualizations of place using a photorealistic kit of parts.

- Allows rapid generation of terrain, buildings, trees, and streetscape using a tool that translates 2D features in GIS to 3D objects in the real-time environment from a generic model library of 3D models.
- Allows you to fly or walk through the 3D environment in real-time.
- A separate modeling tool (MultiGen's Creator-Lite/Model Builder) allows you to create custom models with custom photographs that represent the place more accurately.

[HTTP://WWW.MULTIGEN.COM](http://www.multigen.com)



SiteBuilder. Image: Environmental Simulation Center

Creator/VIO-GIS

A multi-dimensional tool that links 3D real-time capabilities to ArcView GIS. Information can be queried from either environment. Photo-real models are created in the Creator software and viewed with VIO-GIS and ArcView together. The system runs on standard desktop PCs.

- Experience the 3D model from any vantage point.
- Switch design alternatives in real-time.
- See photo-realistic or massing studies in context.
- Save predefined viewpoints and pre-recorded walk-throughs and play them back.
- Allows selection of buildings in 3D with a corresponding selection in 2D. A selection in 2D first will also trigger the 3D.

[HTTP://WWW.ITSPATIAL.COM](http://www.itspatial.com)

CommunityViz

CommunityVizô is a suite of software planning tools that has an impact analysis piece, a 3D real-time viewer, and a policy simulator as part of a complete planning analysis package.

- 3D real-time walk- and fly-throughs.
- GIS analysis allowing user to analyze the impacts of proposed changes to the environment in a moment in time.
- Simulate changes in the environment over time, based on proposed policy decisions about a place.

[HTTP://WWW.COMMUNITYVIZ.ORG](http://www.communityviz.org)

Process Tools

Florida Housing Institute Sustainable Development Toolkit

The FHI Sustainable Development Toolkit ([HTTP://WWW.I4SD.ORG/TOOLKIT.HTM](http://www.i4sd.org/toolkit.htm)) is a set of collaborative processes to support vision-based planning and community development that have resulted from our work in communities. These processes work in conjunction with GIS and place-based planning and decision support tools to aid communities in developing and implementing consensus-driven sustainable development.†

The FHI Toolkit is an inclusive, comprehensive, and proactive process supporting collaborative, interdisciplinary, design-based strategies. It cultivates civic values, an ongoing dialogue about a community's shared vision for the future, and provides continuity to the public process. It generates new capacity to deal with complex local and regional issues. The tools fall into three basic categories:

Getting Started

- Creating a Comprehensive Stakeholder Group
- Doing an Inventory of the Present State
 - Natural, Built, Economic, and Social
- Creating the Vision
- Developing Indicators

Building Capacity and Creating the Workplace

- Creating Centers for Civic Learning and Community Design
- Using GIS and Place-Based Planning and Decision Support Tools

Implementing Over the Long Term

- Discovery and Design Charrettes
- Sustainable Design Elements for Real Estate Development
- Sustainable Urban-Rural Enterprise

CoVision MeetingWorks WebCouncil

Council™ and WebCouncil™ ([HTTP://WWW.COVISION.COM](http://www.covision.com)) are two tools that can enhance community participation in the decision-making process. Council™ is a facilitated process supported by “meetingware” technology including laptop computers and voter keypads to get feedback and ideas from large groups. The computers are networked together using wireless technology, maximizing mobility and reducing setup time.

Predictive Modeling

TRANSIMS

The TRansportation ANalysis SIMulation System (TRANSIMS) ([HTTP://TRANSIMS.TSASA.LANL.GOV](http://TRANSIMS.TSASA.LANL.GOV)) is a set of new transportation and air quality analysis and forecasting procedures developed to meet the Clean Air Act, the Intermodal Surface Transportation Efficiency Act, Transportation Equity Act for the 21st Century, and other regulations. It consists of mutually supporting simulations, models, and databases that employ advanced computational and analytical techniques to create an integrated regional transportation system analysis environment. The integrated results from the detailed simulations will support transportation planners, engineers, decision-makers, and others who must address environmental pollution, energy

consumption, traffic congestion, land-use planning, traffic safety, intelligent vehicle efficiencies, and the transportation infrastructure effect on the quality of life, productivity, and economy.

UrbanSim

Designed to assist communities in integrating their land use, transportation, and environmental planning efforts, UrbanSim is a simulation system that models the real estate development process and the locations of households and jobs based on scenarios of transportation, land use, and environmental policies. It is meant to support a community visioning process by allowing communities to explore the potential consequences of alternative policy scenarios such as light rail or highway expansion, and the use of land use plans and urban growth boundaries to guide development. UrbanSim can evaluate the consequences of land use and transportation policy scenarios at a high degree of detail, subdividing a metropolitan area using a 150-meter grid to represent real estate development and prices, and household and business locations. This detail supports analysis of non-motorized transportation and neighborhood-scale design issues, in addition to regional consequences of major land use and transportation policies. The National Science Foundation and state and metropolitan agencies have funded its development, and it is now operational in several major metropolitan areas and states including Hawaii, Oregon, Utah, and Washington. The UrbanSim system is available from the Internet ([HTTP://WWW.URBANSIM.ORG](http://www.urbansim.org)), and has been developed as an Open Source project, meaning that the software and its source code is free and available for modification and redistribution. Current development is on data integration tools to facilitate transfer of the model to other locations, a web-based interface for community participation, and evaluation and visualization tools to assess and communicate results.

Other Tools

ENERGY 10: A Design Tool for Small Buildings

ENERGY-10 software integrates day-lighting, passive solar heating, and low-energy cooling strategies with energy-efficient envelope design and mechanical equipment, allowing detailed simulation and performance analysis. It is designed to evaluate energy-efficient features in the very early stages of the architectural design process. Ideal building types include schools, libraries, offices, and residential buildings less than 10,000 square feet. Developed by the National Renewal Energy Laboratory, both the software and training are available from the Sustainable Buildings Industry Council.

[HTTP://WWW.SBICOUNCIL.ORG/ENERGY10/INDEX.HTML](http://www.sbicouncil.org/energy10/index.html)

Location Efficient Mortgage Program

The Location Efficient Mortgage (LEM) is an innovative mortgage product that takes advantage of the hidden asset of transit density in urban neighborhoods to encourage homeownership and promote increased transit ridership. The program, developed by Center for Neighborhood Technology (CNT), the Natural Resources Defense Council, and the Surface Transportation Policy Project, uses GIS analysis to identify homes with easy access to transit. With a LEM mortgage, lenders are allowed to recognize the savings made by a household whose primary means of transportation is public transit rather than the private automobile. Thus lenders can “stretch” their standard debt-to-income ratio, ensuring that more low- and moderate-income families, first-time homeowners, and dedicated transit users can obtain mortgages, or larger mortgages for which they would otherwise qualify. Fannie Mae, the nation’s largest supplier of homeownership capital, is sponsoring the underwriting of LEM mortgages.

[HTTP://WWW.LOCATIONEFFICIENCY.COM](http://www.locationefficiency.com)

Resources

Planning Support Systems, Richard K. Brail and Richard E. Klosterman, Editors. 2001, ESRI, Redlands, CA.

Tools for Community Design and Decision Making, by Ken Snyder, pages 99-120, from **Planning Support Systems in Practice**, Stan Geertman (University of Utrecht) and John Stillwell (University of Leeds), Editors. 2003, Springer Verlag, Heidelberg.

AmericaSpeaks

[HTTP://WWW.AMERICASPEAKS.ORG](http://www.americaspeaks.org)

Anavision

[HTTP://WWW.ANAVISION.COM](http://www.anavision.com)

Association of Bay Area Governments

[HTTP://WWW.ABAG.ORG](http://www.abag.org)

Association of Bay Area Governments – GIS

[HTTP://GIS.ABAG.CA.GOV/WEBSITE/WELCOME.HTML](http://gis.abag.ca.gov/website/welcome.html)

Autodesk

[HTTP://USA.AUTODESK.COM](http://usa.autodesk.com)

Building Exploratory

[HTTP://WWW.BUILDINGEXPLORATORY.ORG.UK](http://www.buildingexploratory.org.uk)

Center for Neighborhood Technology – Airhead

[HTTP://WWW.AIRHEAD.ORG](http://www.airhead.org)

City of Houston

[HTTP://WWW.CITYOFHOUSTON.GOV](http://www.cityofhouston.gov)

CommunityViz

[HTTP://WWW.COMMUNITYVIZ.COM](http://www.communityviz.com)

CoVision

[HTTP://WWW.COVISION.COM](http://www.covision.com)

CoVision – Listening to the City

[HTTP://WWW.COVISION.COM/NEWYORK/INDEX.HTM](http://www.covision.com/newyork/index.htm)

Creating Quality Places: Successful Communities by Design

[HTTP://WWW.QUALITYPLACES.MARC.ORG/5_TOOLS.CFM](http://www.qualityplaces.marc.org/5_tools.cfm)

Criterion

[HTTP://WWW.CRIT.COM](http://www.crit.com)

CUBE – Center for Understanding the Built Environment

[HTTP://WWW.CUBEKC.ORG](http://www.cubekc.org)

D.C. Office of Planning

[HTTP://WWW.PLANNING.DC.GOV/PROJECT/WATERFRONT/INDEX.SHTM](http://www.planning.dc.gov/project/waterfront/index.shtm)

Dover Kohl

[HTTP://WWW.DOVERKOHL.COM](http://www.doverkohl.com)

Duany Plater-Zybert & Co.

[HTTP://WWW.DPZ.COM](http://www.dpz.com)

ENERGY10

[HTTP://WWW.SBICOUNCIL.ORG/EN10/INDEX.HTML](http://www.sbicouncil.org/energy/index.html)

Environmental Simulation Center

[HTTP://WWW.SIMCENTER.ORG](http://www.simcenter.org)

Envision

[HTTP://WWW.ENVISIONUTAH.ORG](http://www.envisionutah.org)

ESRI

[HTTP://WWW.ESRI.COM](http://www.esri.com)

Florida House Institute for Sustainable Development

[HTTP://WWW.I4SD.ORG/COMTOOLS.HTM](http://www.i4sd.org/comtools.htm)

[HTTP://WWW.I4SD.ORG/TOOLKIT.HTM](http://www.i4sd.org/toolkit.htm)

INDEX®

[HTTP://WWW.CRIT.COM](http://www.crit.com)

International Council for Local Environment Initiatives

[HTTP://WWW.ICLEL.ORG/GAMES/COMCALC.HTM](http://www.iclel.org/games/comcalc.htm)

Itspatial

[HTTP://WWW.ITSPATIAL.COM](http://www.itspatial.com)

Location Efficient Mortgage Program

[HTTP://WWW.LOCATIONEFFICIENCY.COM](http://www.locationefficiency.com)

Looney Ricks Kiss

[HTTP://WWW.LRK.COM/HOMEPLANS](http://www.lrk.com/homeplans)

National Center for Appropriate Technology

[HTTP://WWW.NCAT.ORG/COMTOOL/](http://www.ncat.org/comtool/)

Northwest University – ABCD Tools

[HTTP://WWW.NWU.EDU/IPR/ABCD/ABCDTOOLS.HTML](http://www.nwu.edu/ipr/abcd/abcdtools.html)

Option Finders

[KWWs ZzSwLrQilQGHUV FRP](http://www.kwws.com/zzswlrqilqghuvfrp)

PlaceMatters.com

[HTTP://WWW.PLACEMATTERS.COM](http://www.placematters.com)

PLACE³S

[HTTP://WWW.ENERGY.CA.GOV/PLACES](http://www.energy.ca.gov/places)

QUEST™

[HTTP://WWW.ENVISIONTOOLS.COM](http://www.envisiontools.com)

Sherry Arnstein – “A Ladder of Citizen Participation”

[HTTP://WWW.PARTNERSHIPS.ORG.UK/PART/ARN.HTM](http://www.partnerships.org.uk/part/arn.htm)

Smart Growth Network

[HTTP://WWW.SMARTGROWTH.ORG](http://www.smartgrowth.org)

Sustainable Communities Network

[HTTP://WWW.SUSTAINABLE.ORG](http://www.sustainable.org)

The Transportation Analysis Simulation System

[HTTP://TRANSIMS.TSASA.LANL.GOV](http://transims.tsasa.lanl.gov)

Urban Advantage: Envisioning Smart Growth

[HTTP://WWW.STEVEPRICE.COM](http://www.steveprice.com)

Urbansim.org

[HTTP://WWW.URBANSIM.ORG](http://www.urbansim.org)

U.S. Department of Energy – Smart Communities Network

[HTTP://WWW.SUSTAINABLE.DOE.GOV/TOOLKIT/TCDDM/HOME2.HTM](http://www.sustainable.doe.gov/toolkit/tcddm/home2.htm)

U.S. Department of Housing & Urban Development

[HTTP://WWW.HUD.GOV/EMAPS](http://www.hud.gov/emaps)

U.S. Department of Housing & Urban Development's Enterprise Geographic Information System (EGIS)

[HTTP://HUD.ESRI.COM/EGIS](http://hud.esri.com/egis)

Web Lab

[HTTP://WWW.WEBLAB.ORG/SGD](http://www.weblab.org/sgd)

What If?ô

[HTTP://WWW.WHAT-IF-PSS.COM](http://www.what-if-pss.com)

Winston Associates

[HTTP://WWW.WINSTONASSOCIATES.COM](http://www.winstonassociates.com)

GIS on the Web

C&S Companies

[HTTP://WWW.CSEENGINEERS.COM/GIS/ERIEEA/VIEWER.HTM](http://www.cseengineers.com/gis/erieea/viewer.htm)

Richland County Geographic Information Systems

[HTTP://WWW.RICHLANDMAPS.COM/RCGEO.HTML](http://www.richlandmaps.com/rcgeo.html)

3D and 3D GIS Software Companies

CommunityViz

[HTTP://WWW.COMMUNITYVIZ.ORG](http://www.communityviz.org)

ESRI

[HTTP://WWW.ESRI.COM](http://www.esri.com)

Itspatial

[HTTP://WWW.ITSPATIAL.COM](http://www.itspatial.com)

Multigen-Paradigm

[HTTP://WWW.MULTIGEN.COM](http://www.multigen.com)

Glossary

- 3D Massing:** This concept refers to a 3D model on the computer that simply shows the volume of a building or a set of buildings. Photo-real imagery and detail is left out because it may not be the focus of the study.
- Adaptive reuse:** An approach to reusing buildings to serve new functions.
- Animation:** A passive 3D environment in which a sequence of frames from a 3D model of place is recorded/rendered and played back to an audience/user. It is a passive experience for the user, much like watching television.
- Biodiversity:** Numbers and types of animal and plant species around the planet.
- Bio-filtration:** The natural water filtration provided by vegetation.
- Brownfields:** Contaminated, underutilized sites in urban, suburban, and rural areas.
- Capacity building:** Developing the skills and knowledge in institutions, communities, and businesses.
- Charrette:** Multidisciplinary brainstorming design process involving all stakeholders.
- Closed loop:** A system in which outputs from one process are used in other processes to reduce or eliminate waste.
- Collaboration:** A process in which people work together in partnerships, alliances, and networks.
- Community assets:** Places, people, and institutions that local residents value.
- Community-based decision-making tools:** Tools that help citizens, planners, and public officials develop alternative scenarios for the future.
- Community indicators:** Economic, environmental, and social metrics developed locally to document and assess what is happening.
- Community-based development:** Planning that involves community members.
- Context-based:** See *Place-based*.
- Decision Support System:** Using a variety of information and visualization tools, stakeholders can make more informed decisions by seeing comprehensively the many impacts and implications of a policy or plan.
- Deconstruction:** A means of taking structures apart for reuse.
- Density:** The average number of residents, households, or buildings in a given area.
- Dialogue:** A communications tool used to help people think together.
- Eco-industrial development (EID):** Industrial and commercial siting in which the waste products (energy, heat, and water) of one feeds another.
- Ecological footprint:** A calculator tool to assess the impact on ecosystems by an individual, household, institution, or business.
- Ecosystems approach:** Viewing a community as an interconnected whole similar to an ecosystem.
- Edible landscapes:** Green spaces that grow edible produce that all the species of the community can enjoy.

Environmental justice:	Fair and just treatment regardless of race, color, or income.	Multi-modal transportation:	A mix of transit (metro, bus, train, and light rail), walking, and biking options.
Equity:	Fairness (see Environmental Justice).	Open space:	Farmland, parkland, and forests.
Farmland preservation:	Preservation of productive farmland and its environs.	Pedestrian-friendly:	Design that promotes ease and safety of walking.
Governance:	Open, transparent, and inclusive governing processes.	Photomontage:	The manipulation of still images of a real place that are edited on the computer to show proposed development or physical changes to an environment.
Graphics Card:	This piece of hardware drives the rendering capabilities of a computer. A powerful graphics card with a lot of texture memory is essential to using 3D realtime visualization software on PCs.	Photo-textured Model:	This concept refers to a 3D model that literally shows the details of a building or landscaping or streetscape photo-realistically. In other words, photographs (referred to as textures) of actual buildings are literally pasted onto the 3D computer model.
Green building:	The design, siting, sourcing, and construction of buildings that makes efficient use of raw materials and natural resources, protects the environment, and promotes sustainable communities.	Place-based:	The process of planning within the context or framework of the specific conditions of a place. Rather than using generic examples or solutions, planners or stakeholders would make a planning decision or develop a planning scenario that responds to the specific conditions and needs of the place and its inhabitants/users.
Green infrastructure:	The network of open space and other natural areas that are life-sustaining.	Place-based planning:	A public planning process designed to maintain, restore, and develop aspects of a particular place.
Green roofs:	Vegetated roofs.	Public/private partnerships:	Collaborations between the private sector and public agencies.
Greenways:	Open spaces that are linked to form corridors for wildlife and recreation.	Quality of life:	A balance of environmental, equity, and economic aspects in a community.
Groundwater:	Water located under the surface of the earth in spaces such as sand, rocks, and aquifers.	Rain gardens:	Native plant garden designed to retain water and limit runoff.
Infill development:	Development in underutilized areas in existing communities.	Real-time:	A dynamic 3D visualization environment in which a user can interact with a 3D model on the computer, walking or flying through the virtual space freely and at a rendering frame rate equivalent to live action.
Interdisciplinary:	A process of working across professional fields.		
Location efficient mortgages:	An incentive tool to encourage urban dwelling near transit.		
Low impact development (LID):	Ecological, site-specific practices designed to reduce runoff and enhance water quality and the environment.		
Massing:	See 3D Massing		
Mixed use:	Co-locating businesses, residential units, and transit in close proximity.		

Rendering time:	An animation term that refers to the frame rate required to visualize a scene or a series of scenes. Rendering time is measured in “frames per second.”	Transit-oriented development:	Development specifically sited around transit stops to increase mixed use.
Renewable energy:	Energy from the sun, wind, water, and earth that does not deplete natural resources but is renewable.	Visioning:	The process of bring diverse members of a community together to envision a desirable future.
Smart Growth:	Development that serves the community, the environment, and the economy.	Visual Preference Survey:	This process refers to a series of photographs representing different scenarios of physical planning as preferences or choices that a community would choose from. (choosing from three alternatives – photos of three different densities along urban corridors)
Social capital:	The invisible relationships and skills within a community that keep it strong and vibrant.	Visual pollution:	Structures within a community that detract from its appeal, such as billboards and utility lines.
Stakeholders:	All those involved in the outcomes of decision-making.	Walkable communities:	Neighborhoods designed to promote walking.
Still imagery:	Photographs of a place or a snapshot of a 2D map/3D computer model of a place. They can be stitched together as a “photomontage” or placed on a website for easy access to concepts produced from a computer model.	Watershed:	The entire water system that drains into a major body of water, such as the Chesapeake Bay.
Sustainable communities:	Communities that are socially just, environmentally healthy, and economically vital.	Windows-based:	A characteristic of software that is platform/operating system dependent. ArcView GIS and CommunityViz are examples of visualization and analysis software that is Windows-based.
Sustainability:	A process of continuous improvement that involves everyone in creating a future that works for all.		
Systems thinking:	Processes of making the connections between all the elements so that multiple benefits accrue.		
Tools for community-based decision-making:	Diverse tools that singly and/or in combination engage stakeholders in open processes to create more livable communities.		
Traffic calming:	Techniques designed to slow, direct, and contain traffic flow.		
Transit:	Public mobility such as buses, trains, metros, and light rail.		

About the Authors

CONCERN, Inc. Founded in 1970, CONCERN is a national nonprofit environmental education organization with a focus on sustainable communities. Through its **Sustainable Communities Program**, CONCERN seeks to increase public understanding of and participation in initiatives that are environmentally sound, economically vital, and socially just. It disseminates examples of successful initiatives, offers numerous resources and guidelines for action, serves as a clearinghouse for information, and collaborates with others to carry out its programs. It facilitates the exchange of information on sustainability and smart growth through the Sustainable Communities Network website ([HTTP://WWW.SUSTAINABLE.ORG](http://www.sustainable.org)) and the Smart Growth Network website ([HTTP://WWW.SMARTGROWTH.ORG](http://www.smartgrowth.org)).

Environmental Simulation Center. At the Environmental Simulation Center (ESC), revolutionary techniques promise to change the way our cities, towns, and rural areas are planned, designed, and developed. Visualizing the future through simulation techniques is one of the most powerful tools for making informed design and planning decisions. The ESC's professional staff of architects and planners has broad experience in architecture, urban design, zoning regulations, historic preservation, and computer simulation technology. We are committed to integrating urban design and planning with technologies that extend the capabilities of citizens and decision-makers in a participatory planning process.

At the ESC, this dynamic process is used to inform every step of a design as it evolves. By integrating words, numbers, and images in an information-rich, virtual reality environment, the design, scope, and physical impact of proposed projects can be assessed in real-time, as if they were actually built. In a technologically mediated, design-workshop setting, the ESC works with clients to interactively plan and design alternatives, formulate and test strategies, and develop implementation techniques. This unique approach to design enables open and informed decision-making, and therefore can be instrumental in helping a community reach consensus. The ESC promotes the idea that independent, objective, and verifiable information can make complex issues comprehensible to both the general public and design professionals. This allows all parties to participate equally in the decision-making process, and enhances the level of public debate in the planning and design of the built environment. For more information visit [HTTP://WWW.SIMCENTER.ORG](http://www.simcenter.org).