Planning 2.0:
GIS for Community Development

By Ahmed Abukhater, Ph.D.

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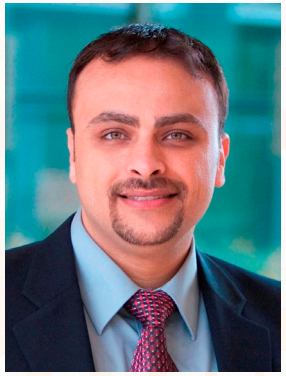
About the Author



Dr. Ahmed Abukhater is the Global Industry Manager for Community Development at Esri. He is dedicated to promoting a holistic approach to addressing community development needs through the creation of effective planning and economic development solutions. His passion for data-driven analysis and place-based decision making has shaped his vision of geospatial intelligence, promoting GIS as the industry-standard technology around the globe.

With over a decade of leadership in various executive management roles in the U.S. and overseas, he is a noted expert in a number of areas including environmental science, sustainable development, planning support systems (PSS), and conflict resolution and mediation. Abukhater holds a Ph.D. in community and regional planning from the University of Texas at Austin, a master's degree in urban and regional planning from the University of Illinois at Urbana-Champaign, and a bachelor's degree in architectural engineering. Throughout his career, he has authored numerous publications, served on many governing and advisory boards, and received more than 20 prestigious awards for his work.

About Esri

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What Is GIS?

Making decisions based on geography is basic to human thinking. Where shall we go, what will it be like, and what shall we do when we get there are applied to the simple event of going to the store or to the major event of launching a bathysphere into the ocean's depths. By understanding geography and people's relationship to location, we can make informed decisions about the way we live on our planet. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions.

GIS organizes geographic data so that a person reading a map can select data necessary for a specific project or task. A thematic map has a table of contents that allows the reader to add layers of information to a basemap of real-world locations. For example, a social analyst might use the basemap of Eugene, Oregon, and select datasets from the U.S. Census Bureau to add data layers to a map that shows residents' education levels, ages, and employment status. With an ability to combine a variety of datasets in an infinite number of ways, GIS is a useful tool for nearly every field of knowledge from archaeology to zoology.

A good GIS program is able to process geographic data from a variety of sources and integrate it into a map project. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available. Map file databases often come included with GIS packages; others can be obtained from both commercial vendors and government agencies. Some data is gathered in the field by global positioning units that attach a location coordinate (latitude and longitude) to a feature such as a pump station.

GIS maps are interactive. On the computer screen, map users can scan a GIS map in any direction, zoom in or out, and change the nature of the information contained in the map. They can choose whether to see the roads, how many roads to see, and how roads should be depicted. Then they can select what other items they wish to view alongside these roads such as storm drains, gas lines, rare plants, or hospitals. Some GIS programs are designed to perform sophisticated calculations for tracking storms or predicting erosion patterns. GIS applications can be embedded into common activities such as verifying an address.

From routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives people the geographic advantage to become more productive, more aware, and more responsive citizens of planet Earth.

GIS for Community Development

Local government professionals have always been involved in developing communities we would all want to call home.

Originally, this meant designing and maintaining cities and counties through land-use regulation and infrastructure support. Agencies have had to balance the needs of residential neighborhoods, agricultural areas, and business concerns. Now, in addition to that complex challenge, local governments must factor into these decisions the requirements of a growing list of regional, state, and federal agencies as well as special interest groups. In addition, the need to maintain and foster ongoing citizen engagement in the planning processes poses another challenge.

Rapidly changing economic conditions have further complicated the process by threatening the funding needed to carry out these functions. To date, local governments have been rightsized and downsized and had budgets drastically cut while trying to maintain service levels. Information technology—especially geographic information systems—has proved crucial in helping local governments cope in this environment.

GIS software helps planning, building and safety, public works, and engineering professionals meet or exceed these demands. Using GIS software from Esri, local government staff have discovered how traditional tasks can be performed more efficiently, and those previously impractical or impossible can be easily accomplished.

GIS can help local governments

- Increase efficiency.
- Save time.
- Generate revenue.
- Provide decision support.
- Improve accuracy.
- Manage resources.
- Automate tasks.
- Save money.

Effective Growth Management

Demonstrating the MCE capabilities of GIS

Summary

The need to make land-use decisions on a national and regional scale in Canada was the impetus for the development of GIS. Roger Tomlinson, the acknowledged father of GIS, led the Agricultural Rehabilitation and Development team that developed what became known as the Canada Geographic Information System. Land use analysis has remained an important GIS application. This article illustrates how criteria reflecting different planning goals can be incorporated into analysis by modifying the parameters of GIS tools in ArcGIS.

GIS allows for multiple criteria evaluation (MCE). This analysis is mainly characterized by allocating weights to assessment criteria for suggesting and ranking alternatives. GIS spatial planning support tools have an important advantage—changing the valuation criteria to visually illustrate and depict the implications of different spatial decisions and alternatives is convenient. The capabilities needed for decision making readily available in a single system make GIS a great tool for integrating in planning processes. This article describes a study that showed how GIS spatial analytical tools can be used to effectively shape decisions that foster urban growth management.

Purpose of the Study

The study identified desirable locations for anticipated low-density residential projects in the Champaign–Urbana region, Illinois. The analysis was based on two almost contradictory approaches and compared the resulting maps.

The sites were analyzed and evaluated according to two scenarios. The first scenario was based on the developer's point of view and took into account the purchasers' preferences. This scenario considered the developer's preferences pertaining to economic and marketing factors. To that end, the developer was interested in maximizing profit and minimizing the cost of the development and paid little or no attention to environmental concerns.

The second scenario was based on the environmentalists' point of view, which is the opposite of the first scenario. In this scenario, sites were ranked and evaluated on potential for engendering environmentally friendly development. In this regard, protecting the agricultural and forest lands and maintaining the integrity of the environment were the most decisive factors in influencing environmentalists' criteria and decisions.

Site Selection Criteria

The site selection suitability analysis conducted for the study included weighing the different factors in both scenarios and ranking desirable sites. The outcome of both scenarios was evaluated and analyzed based on features of the site and features of the surrounding area.

Factor	Requirements
Location in 100-year floodplain and/or wetland areas	The site must avoid floodplain designated areas or areas that have high runoff rates to prevent any environmental hazards.
Soil type	The site must avoid soils with low bearing strength or poor drainage.
Topography	Avoiding sites that have steep terrains reduces the cost of site grading. Constructing on steep slopes means that a tremendous amount of site grading is necessary for adequate drainage and sewage systems.
Site size	The site should be of a minimum size to increase the overall project profitability.

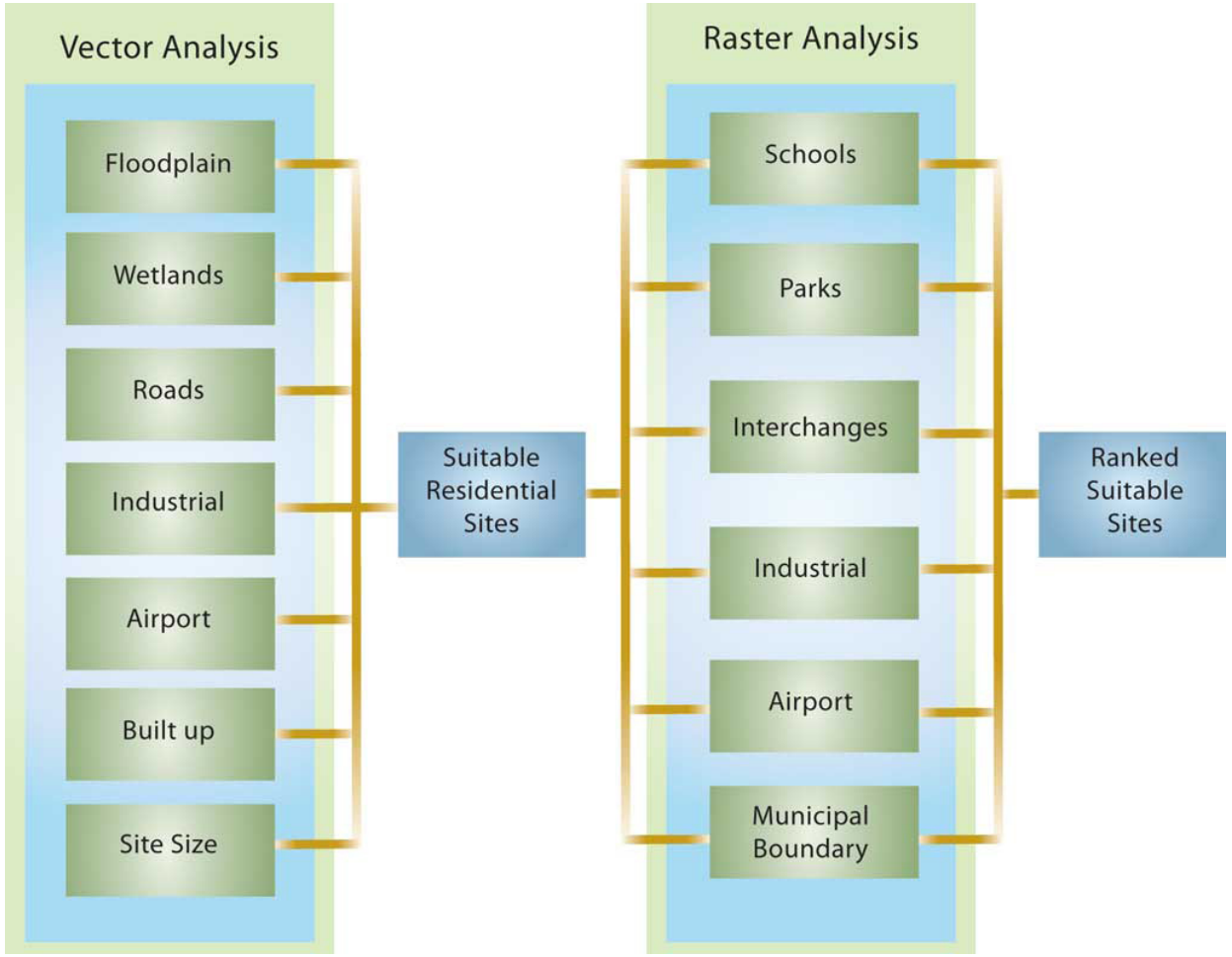
Site-specific selection factors.

Factor	Requirements
Proximity to the existing urbanized areas	The site should be connected to existing residential areas with a high growth potential. This condition ensures that the site is adequately served by the existing facilities and infrastructure. A desirable distance from the nearest built-up areas should not exceed a half mile.
Environmental legislation compliance	To preserve the environmental quality of the area, the site must avoid environmentally sensitive sites and open spaces.
Accessibility	The site must be accessible and well connected by the transportation network to ensure that the commute time required for work, entertainment, or shopping trips does not exceed 30 minutes.
Proximity to industrial and landfill sites	A minimum distance of one mile from landfill and industrial locations and other noxious land uses must be secured to prevent noise and eliminate the immediate threat of chemical emissions harmful to public health.
Airport location	A minimum distance of one mile from the airport, located to the south of the Champaign-Urbana region, was deemed sufficient to avoid adverse impacts of airport noise.

External site selection factors.

Analytic Procedures

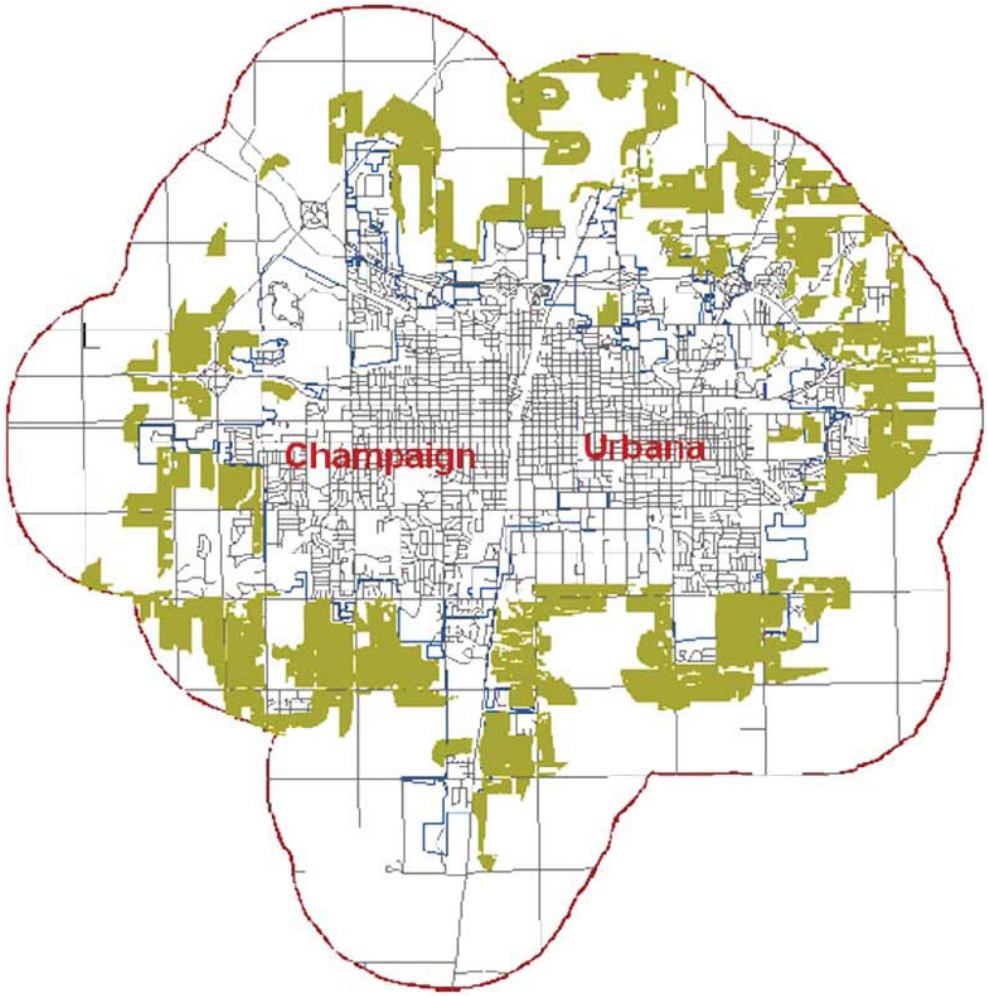
The analytic steps conducted in this study were combined into two major categories: vector analysis and raster analysis.



Overview of the analytical procedure.

Vector-Based Analysis

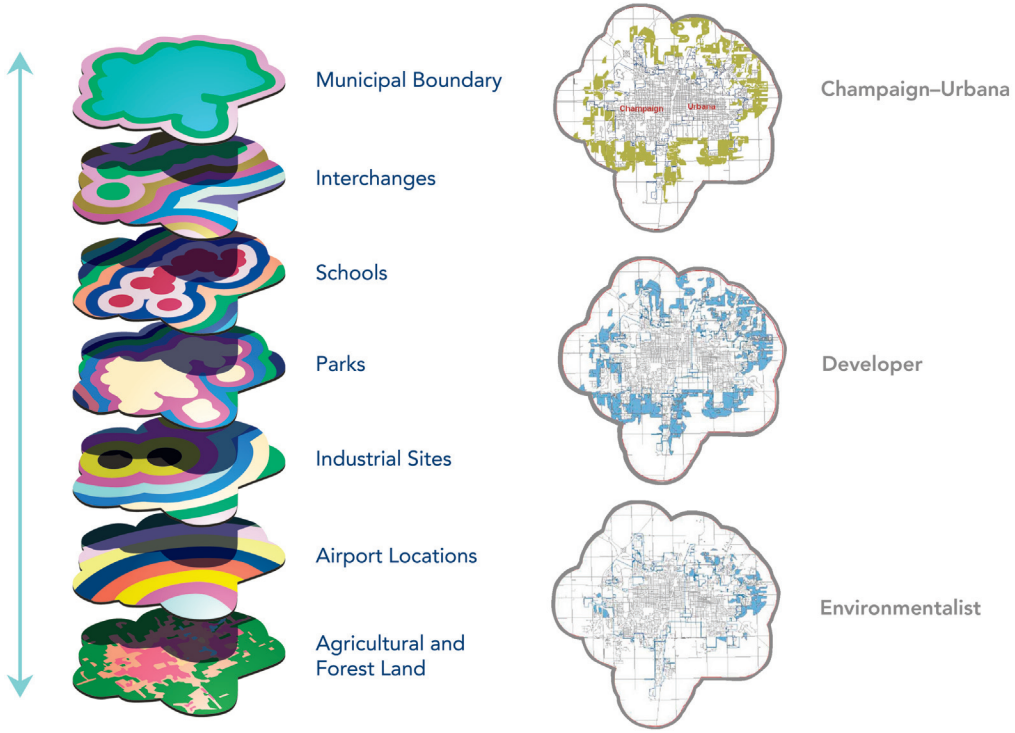
Using vector-based geoprocessing tools, the final layers were juxtaposed on one map that showed sites initially identified as suitable for low-density residential development. At this stage of the analysis, the output did not reflect either the developer's or the environmentalist's concerns.



Map resulting from vector-based analysis showing sites initially identified as suitable for low-density residential development.

Raster-Based Analysis

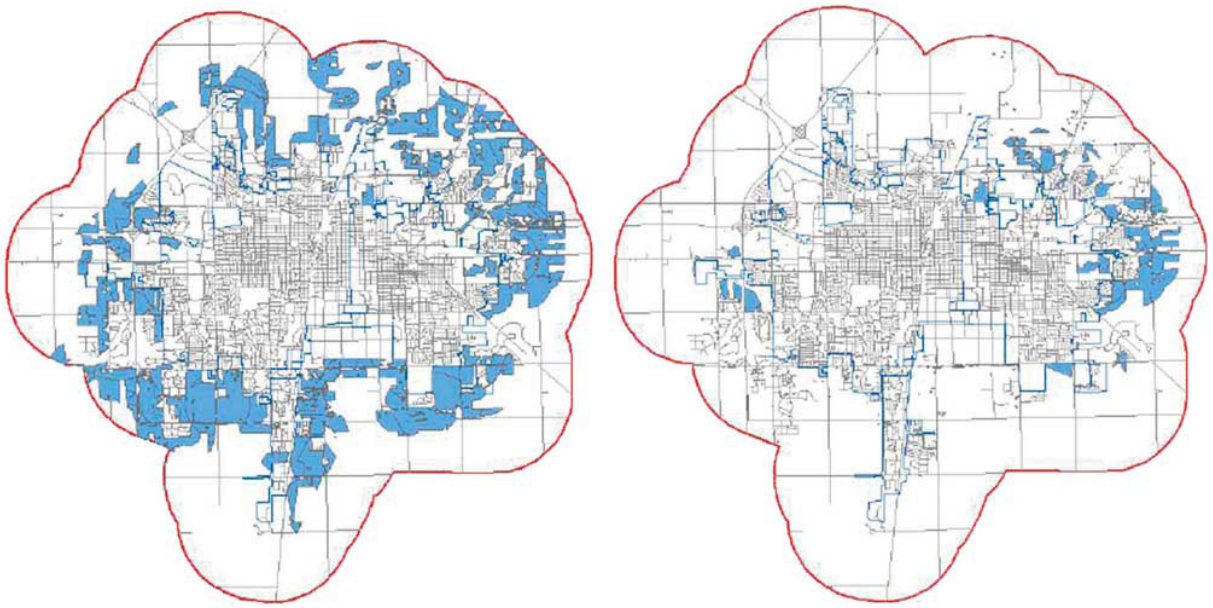
This analysis considered the two scenarios, introduced in the beginning of the study, that represented a developer's viewpoint and an environmentalist's viewpoint. All layers were classified according to a 10-category color scale for consistency purposes.



The raster layers used in raster analysis.

Conclusion

The findings from this study were mapped and provided a comparison of the results obtained from both scenarios. Suitable areas for the low-density residential development in the developer's scenario cover a significantly larger portion of the region than the environmentalist's conservative scenario. Because developers typically do not pay a great deal of attention to environmental factors, many more areas were proposed for development. Conversely, environmentalists' efforts to preserve the natural resources of the region greatly limited the amount of land perceived as suitable for future development.



Maps illustrate ranked sites based on developer and environmentalist preferences.

This study provided an example of how GIS could be used to support planning tasks and help make better decisions regarding real-world planning issues and develop communities more effectively. It emphasizes the role of GIS in urban growth management practice and land-use planning decision making. The study argued for the full utilization of GIS in ways that maximize its contribution to the planning practice instead of limiting its application to mapmaking and cartography only.

GIS can deliver insights from data by identifying, displaying, analyzing, and deciphering real-world problems. GIS-based technology provides state-of-the-art analytical and management tools to spatially analyze and study patterns and spatial variations and correlations to make more informed decisions.

(Reprinted from the Spring 2008 issue of *ArcUser* magazine)

Fostering Citizen Participation

Planners constantly make decisions and have to think on their feet. Though the voices of elected leaders and officials ring loudly in their minds, planners must also be careful to listen closely to the voices of the citizens they serve. Planning for the people requires involving communities from the very onset of the planning process, which must be comprehensible, transparent, legitimate and interactive. When planners fail to engage communities and only follow the status quo, the outcomes are undesirable at best.

To engage citizens today, it is important to communicate in new ways and provide collaborative decision-making platforms. Exchanging information effectively in planning means expanding the communication footprint, moving beyond technical jargon and the resulting language boundaries. It also means holding conversations outside traditional in-person community meetings and forums to reach across the entire community.

Social media tools and the GeoWeb answer this call, and planners are already utilising these Web 2.0 technologies to create effective planning support system (PSS) platforms that cater to planning processes and workflow needs. The emerging Planning 2.0 environment fosters the bi-directional citizenry participation that is so critical today. Open, accountable, interactive government takes us to a higher level of democracy, where citizens are empowered in new, bold ways to help shape the decision-making process and define desired future conditions. For this to happen on a broad scale, a profound transformation in the way planners conduct their business is required.

How should planners leverage Planning 2.0 to connect with their communities? Dr. Zorica Nedovic-Budic, professor and chair of spatial planning and GIS at the School of Geography, Planning, and Environmental Policy at University College Dublin sees Planning 2.0 technology as readily available for use by planners. She also believes that new communication channels and tools ought to provide information that is relevant to the varied urban communities. This is meaningful information that sends clear messages about the community-its condition, issues, prospects and the forces and factors affecting its future. She also notes that capacity building is the key to widespread adoption. She also observes that there is an uneven landscape of technology usage even among planners and within government organisations, let alone in the broader environment. The high-quality and innovative ideas are not necessarily related to the ability to utilise the technological tools. Insights into both status quo and future solutions are embedded deep within the community. Designing the interfaces that would reach to this depth is the main task that planners face.

Her notion of interface includes meeting points, Internet access nodes (in private and public spaces), and opportunities and formats for expressing opinions and ideas. Web 2.0 is here to facilitate those interfaces, but only as part of the overall setting and process. The challenge for planners and their technical support staff is to carefully integrate the new tools in well thought-out exchanges with the public. It is an art of public debate that could be enhanced with Planning 2.0 along with other information and communication technologies.

Michael Gallis, an expert in developing integrated multi-system approaches to strategic planning, observes that effective planning processes should include a civic engagement and a communication strategy to ensure that the broadest involvement of stakeholders and the public is made possible. The most common form of civic engagement is the town hall meeting. This type of meeting is typically focussed on a single topic area, which can be either very broad or quite narrowly focussed (e.g., future community vision or project input). The strength is in its openness and inclusiveness, but its weakness is that it is still limited in both attendance and the ability of its participants to continue to provide input following the meeting.

Gallis notes that more sophisticated techniques are available to broaden public participation. These techniques are based on creating a hierarchy of engagement opportunities that extend from steering committees, advisory boards, topic-specific task forces and town hall meetings. The strength of these more sophisticated processes is that they offer additional structure and ongoing involvement, but their weakness is that the coordination of activities becomes a very expensive and time-consuming process that most planning agencies cannot afford. Communication strategies used in planning processes exhibit the same simple-to-complex range, from flyers sent out to announce meetings and public events to more sophisticated techniques involving print and broadcast media.

The concept of Planning 2.0 is especially relevant to the quest of democratic processes. To that end, social media and the GeoWeb can deliver data acquisition and dissemination capabilities and provide the needed societal infrastructure for human interaction wherein the government can obtain feedback from the public with a high level of transparency and accountability. This will take us to a whole new level of democracy, where citizens are empowered to help shape the decision-making process and define desired future conditions. For this to happen, a profound transformation in the way planners conduct their business is warranted.

The success of planners in combating chronic urban problems is largely determined by their ability to communicate their ideas and the extent to which they proactively seek public involvement and support to execute them. This is especially important because planners do not plan for themselves-they plan for people, and the people are flocking to new forms of communication. Now it's up to planners to embrace them.

(Reprinted from the February 2010 issue of *GIS Development* magazine)

Making Smart Growth Smarter with GeoDesign

Ahmed Abukhater, Esri, and Doug Walker, Placeways

Summary

GeoDesign combines design and GIS to create tools and processes for urban planning, architecture, design and community development. Ahmed Abukhater of Esri and Doug Walker of Placeways explore the place of GeoDesign in Smart Growth principles and share a case study from Kelowna, British Columbia.

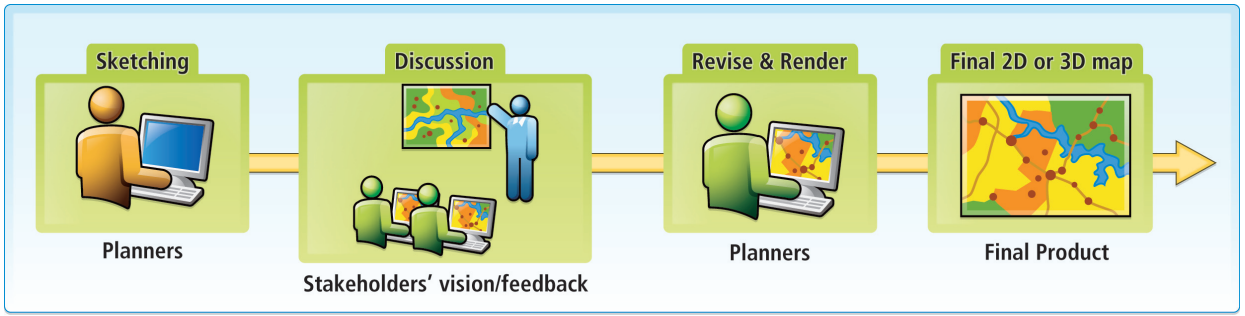
GeoDesign is an emerging term for a technique that combines design and GIS technology to create cutting edge tools for urban planning, architecture, design and community development. This article describes how GeoDesign is reinvigorating Smart Growth plans and planning processes.

Why Smart Growth Needs to Be Smarter

Smart Growth is called "smart" because it seeks to strike an intelligent balance between unfettered sprawl and restrictive no-growth policies. Despite drawbacks, its principles of compact development, reduced automobile dependence, mixed uses, reduced resource consumption and increased emphasis on sense of community are widely admired. (Smart Growth detractors point, for example, to potential problems with population density and congestion, social equity, affordability and continuing consumer demand for conventional subdivisions.) But to move successfully from these academic principles to on-the-ground implementation requires a great deal of work.

One of the biggest hurdles is in understanding how to apply Smart Growth principles in a local context. For example, the mix of uses that is best for a growing city full of young professionals will be very different from the mix of uses needed for an area whose youth are migrating elsewhere and whose remaining population is aging.

Another significant hurdle is the conventional planning process.



At its best, Smart Growth seeks to balance a wide spectrum of needs that cover the economic, environmental and social systems operating in a community. That broad net means that planners, elected officials, the public and experts from many fields need to work together toward mutual understanding. But the conventional comprehensive planning and zoning process, which is mostly linear, expert-dominated and rigid, discourages needed collaboration and public engagement.

Smart Growth becomes smarter when innovative techniques and new technologies are used to help develop more context-sensitive plans and support a more flexible, collaborative planning process. An increasingly powerful part of this help comes from tools for GeoDesign.

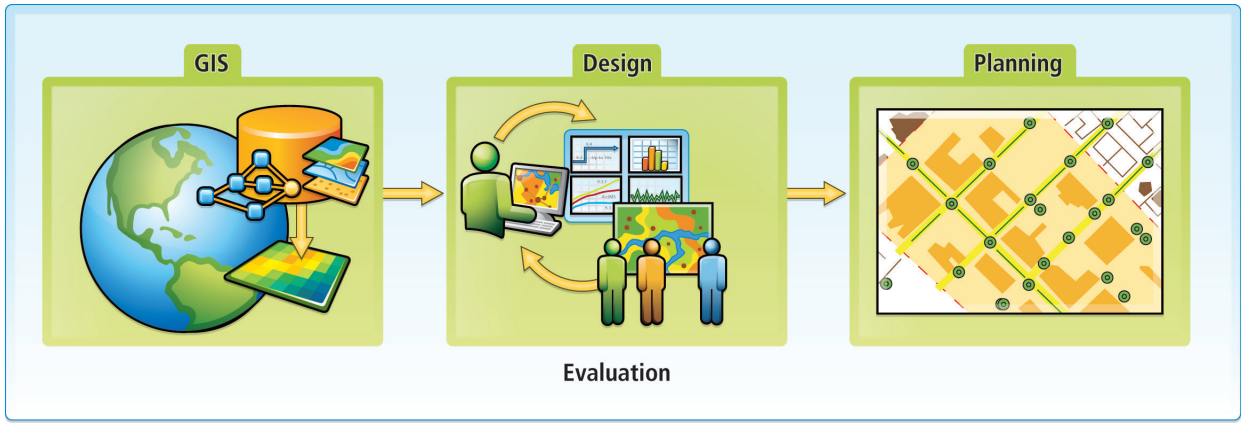
GeoDesign for Smart Growth

Most planners are already using GIS at some level. At the least, their future land use maps are made with GIS tools, and their parcel data are stored in GIS databases. This type of use does not take advantage of full GIS capabilities. GeoDesign combines the information capacity of GIS with the decision making process of design, yielding tools that are informative, interactive and ideal for Smart Growth plans and planning processes.

While GeoDesign is still a loosely defined term, it includes at least four elements:

- Sketching is the concept of drawing potential designs or plans, usually with approximate parameters and few details. It does not need to be limited to lines and colors; it can include any data changes like putting numbers in tables, changing building heights, or turning on a new power plant. Some planners have always done sketching naturally in their heads; GeoDesign allows them to demonstrate and communicate their ideas even at the earliest stages of invention. With GeoDesign, sketching is often public. It provides a collaborative brainstorming environment.

- Spatially informed models estimate how various systems (environmental, economic, etc.) will respond to the plans suggested by the sketches. These models provide information on both impacts (like costs or water consumption) and change (like population growth rates or development patterns).
- Fast feedback gives near-immediate results from modeling the effects of a sketch. This means that a GeoDesign tool can support collaboration or a brainstorming session.
- Iteration is a hallmark of GeoDesign. You sketch an idea, find out its implications, make adjustments and try again, often many times within a single work session. The freedom to try many alternatives has advantages besides simple speed. For example, it encourages creativity, helps teams work together, and increases understanding of the complex systems that Smart Growth planning addresses.

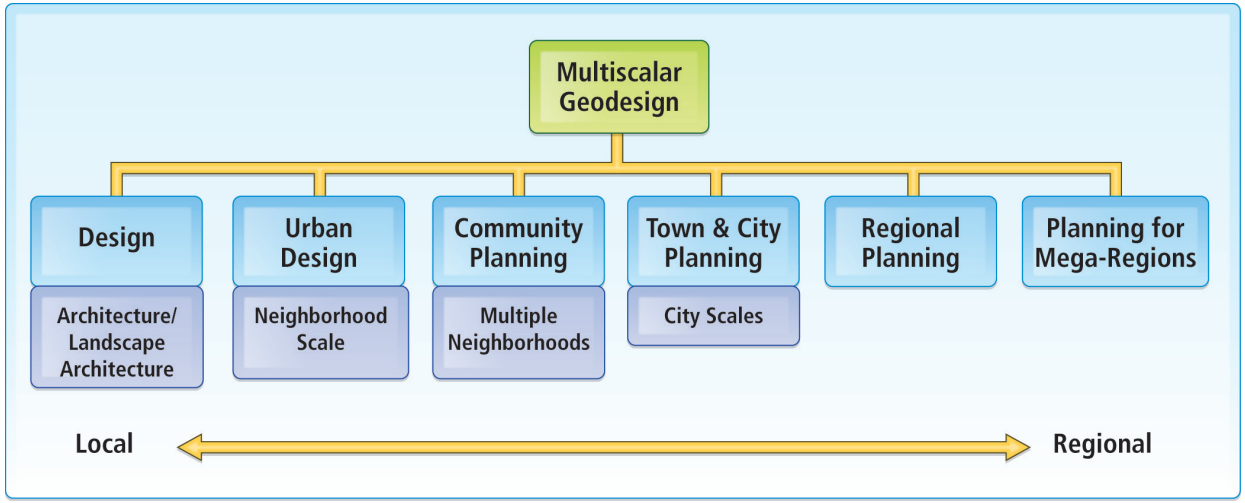


GeoDesign is an art form because it incorporates elements of sketching and design. It is a science because it incorporates elements of modeling and analysis. In light of this, the functional definition of GeoDesign for Smart Growth is the art and science of geospatially enabled sketching and modeling. GeoDesign enhances collaboration, scenario generation, monitoring of implications, ongoing feedback, and evaluation and selection of optimal designs that reflect a community's needs and visions for the future.

Some planners are accustomed to the idea of scenario planning, in which potential alternative futures are modeled and measured as a way of making decisions about present-day actions. GeoDesign and scenario planning are closely related; their differences are mostly semantic. The simplest distinction is that GeoDesign allows real-time changes in the plan, while scenario planning relies more on comparing a few premade alternatives. Many tools that support scenario planning also support GeoDesign, and vice versa.

Collaborative/ Participatory GeoDesign

Historically, planning has been done by experts on behalf of the communities they serve. Public reviews of plans have been seen as inconvenient procedural requirements with mostly symbolic value. But a new paradigm replaces planning for people with planning with people. Residents are experts, too, in their own way; they know more than anyone about the history, values and culture of where they live, and they have a deep understanding of how the informal systems of the community work. Instead of parachuting planners into specific communities and expecting them to come up with smart solutions without a frame of reference about the history of the place or the local planning culture, we need to listen to and engage the real experts (the people who live there and know what works and what does not). Smarter Smart Growth considers these factors alongside conventional planning needs, and GeoDesign helps make it possible for the public to engage in the process and contribute in meaningful ways.



Multiscalar GeoDesign

Planners tend to think of design at a site scale, but GeoDesign covers a variety of scales, bridging the gap between the regional and the local contexts. This is important, because to be practically effective and politically prudent, Smart Growth plans need to make sense across a spectrum of scales and disciplines. This ranges from design, urban design, community planning, town and city planning, and regional planning, up to planning for mega-regions.

Technology for GeoDesign

GeoDesign is a new term for a technology that already has strong roots. ArcGIS itself has always had basic GeoDesign abilities, but with the release of ArcGIS 10, GeoDesign has become a centerpiece of the application. One of the best established GeoDesign tools for planners is CommunityViz, an ArcGIS Desktop extension designed expressly for scenario planning.

GeoDesign Project Planning Example

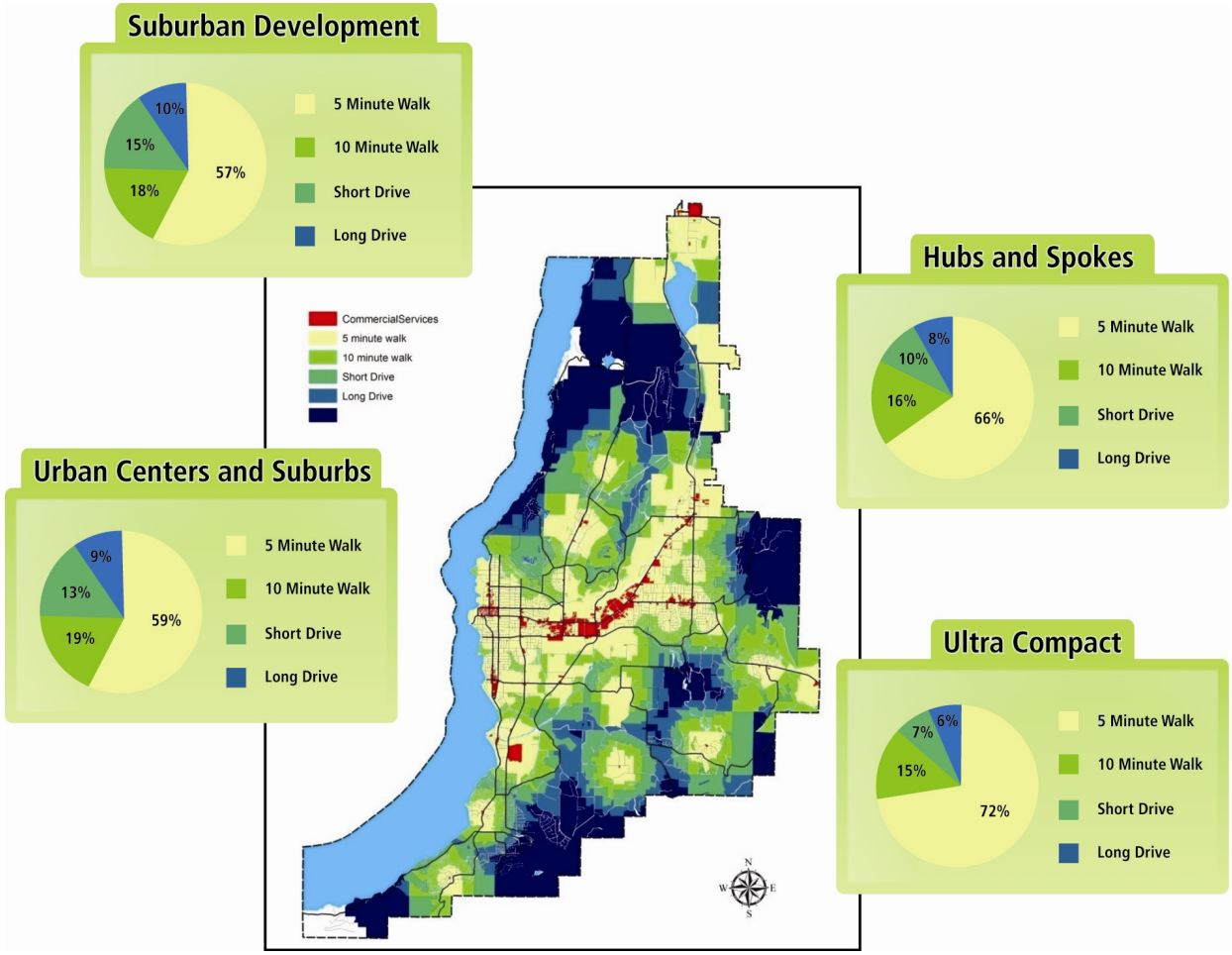
Kelowna, British Columbia is a growing Canadian city of a little over 100,000 residents. In 2009, the city set out to update its Official Community Plan (OCP), which is like an American comprehensive plan. It placed strong emphasis on analyzing sustainability measures that are similar to Smart Growth principles, and retained Urban Systems, Ltd. and Placeways, LLC to support the process with ArcGIS and CommunityViz software.

Sketching—A central part of the effort was sketching and analyzing potential future land use maps. Using CommunityViz, the project team created maps representing four contrasting development scenarios that ranged from suburban development to ultra compact. As they created each map, they were able to sketch small and large variations on the basic theme of the scenario. (In this case, the sketching was done via table input for added precision. They could also have used more conventional hand drawings on the map.)

Spatially informed models—CommunityViz provided a platform for setting up a wide variety of spatially-informed impact models that measured the sustainability effects of the sketched plans. One part of the analysis, for example, calculated the number of households that would be within walking distance of commercial services. Another looked at the area of open space and agricultural lands consumed, while still others monitored the mix of land uses.

Fast feedback—Data regarding impacts were displayed in several forms, including map symbology, dynamically updated charts, and Excel spreadsheets that had been electronically linked to CommunityViz.

Iteration—The plans went through several rounds of review that included small team meetings among planners, large public sessions, and more formal reviews with the city council. At many stages along the way, the sketched plans were tweaked and adjusted. However, the CommunityViz analysis did not need to change, because its models were set up to update automatically and produce new feedback on the basis on the new sketches.



This project demonstrated the successful use of GeoDesign technology to help the public and elected officials make informed policy decisions during a comprehensive planning process. Using ArcGIS and CommunityViz to analyze, visualize and communicate ideas helped make the project a success.

GeoDesign Benefits

GeoDesign can make Smart Growth smarter by improving both Smart Growth plans and the Smart Growth planning process.

The plans are better because they are based on more accurate, complete information. GeoDesign provides information about a plan's implications very early in the planning process, while plans still exist only as sketches and ideas. GeoDesign does not necessarily replace the more thorough, careful analysis that needs to follow as policies are written, budgets are drafted, and service capacities are engineered. Yet it does help ensure that the initial plan sets the smartest direction possible.

The process is better because it is more transparent and inclusive. The inclusiveness comes from GeoDesign's ability to engage broad audiences who would otherwise lack the means by which to contribute. The transparency comes from the way GeoDesign makes information and trade-offs explicit: everyone can see how this sketch leads to that result.

GeoDesign technology has been available for several years. With rapid increases in computer processing power and the release of ArcGIS 10, the tools are advancing even more rapidly. The bottom line is that GeoDesign offers an opportunity for fresh improvements to old approaches for implementing Smart Growth and making Smart Growth smarter.

(Reprinted from *Directions* Magazine, July 19, 2010)

GIS for Planning and Community Development: Solving Global Challenges

Summary

GIS helps us better understand our world so we can meet global challenges. By applying what we know of science and GIS to what we do not know, we can get to what we really need to know—how to enhance quality of life and achieve a better future. These issues are spatial in nature and require spatial tools and spatial thinking. GIS is a key tool for planners as they plan for and with people.

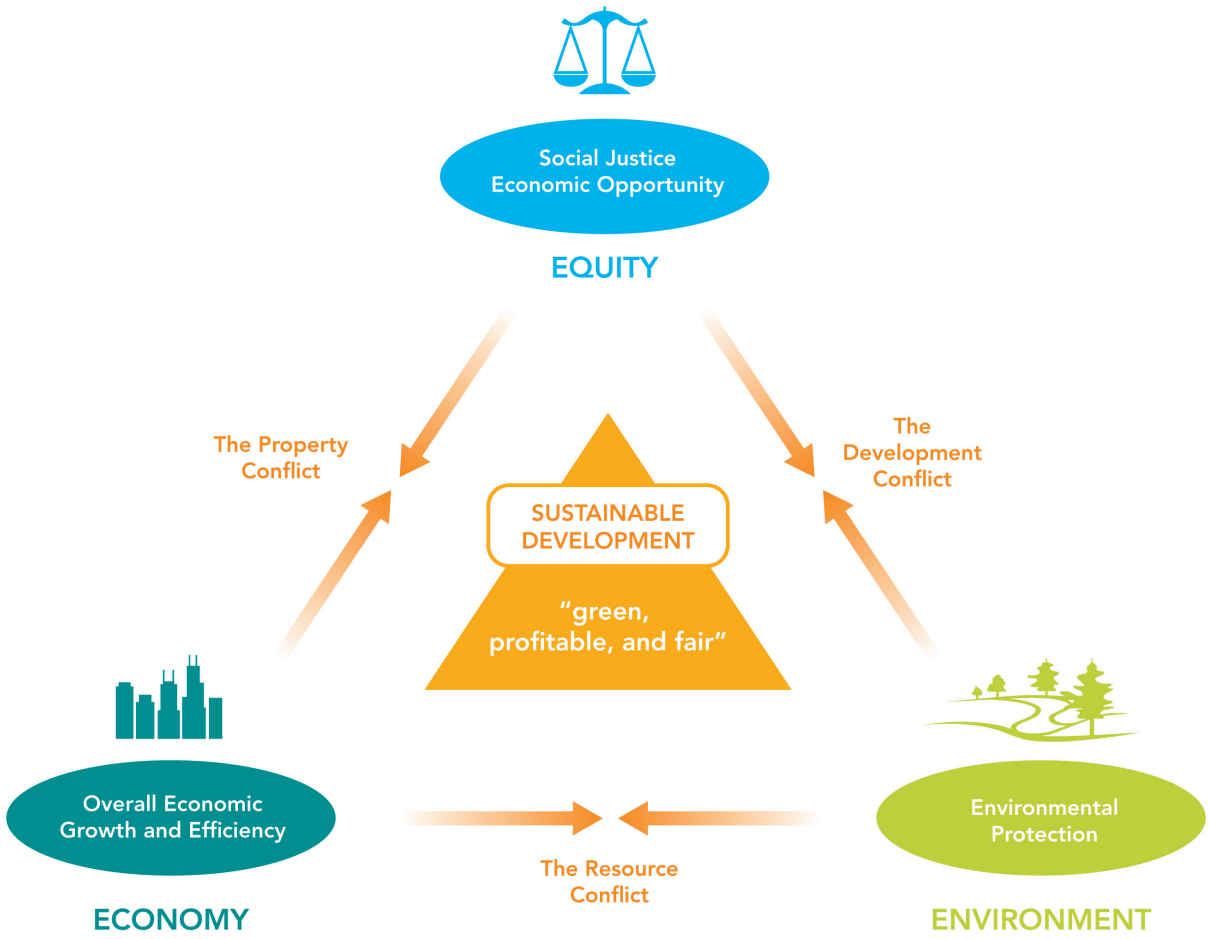
Each day, policy makers aspire to achieve desired future conditions, but the rapidly changing world challenges planning professionals to reach these goals. Two competing factors are creating continuous environmental and social crises. The first is the natural world with its sensitive areas and limited and disputed resources. The second is the human footprint with an expanding population that threatens many of these resources. The combination of these factors results in many complex urban and environmental problems.

The challenges we face are expanding across multiple regions and scales including social and environmental conflicts, air pollution, climate change and inequitable allocation of resources. Expanding urbanization and population prompt planners and policy makers to look for a better understanding of the problems we face and ways to meaningfully address these issues—particularly in large urban areas where housing shortages are becoming critical.

Because we live in a rapidly changing world, our future is contingent on what we do today and the nature of our intervention. We need the future to not simply happen to us but rather be one that we shape and define today. We need greater knowledge of our environment and our relationship with it as well as awareness of how to protect its valuable resources through conservation of nature. We also need to foster efficiency and sustainability by relying on alternative fuels and policies that promote energy efficiency. It's essential that comprehensive planning takes into account all key aspects that impact our existence. To achieve this, we need to involve many parties and foster a shared vision that translates into concrete, collaborative action.

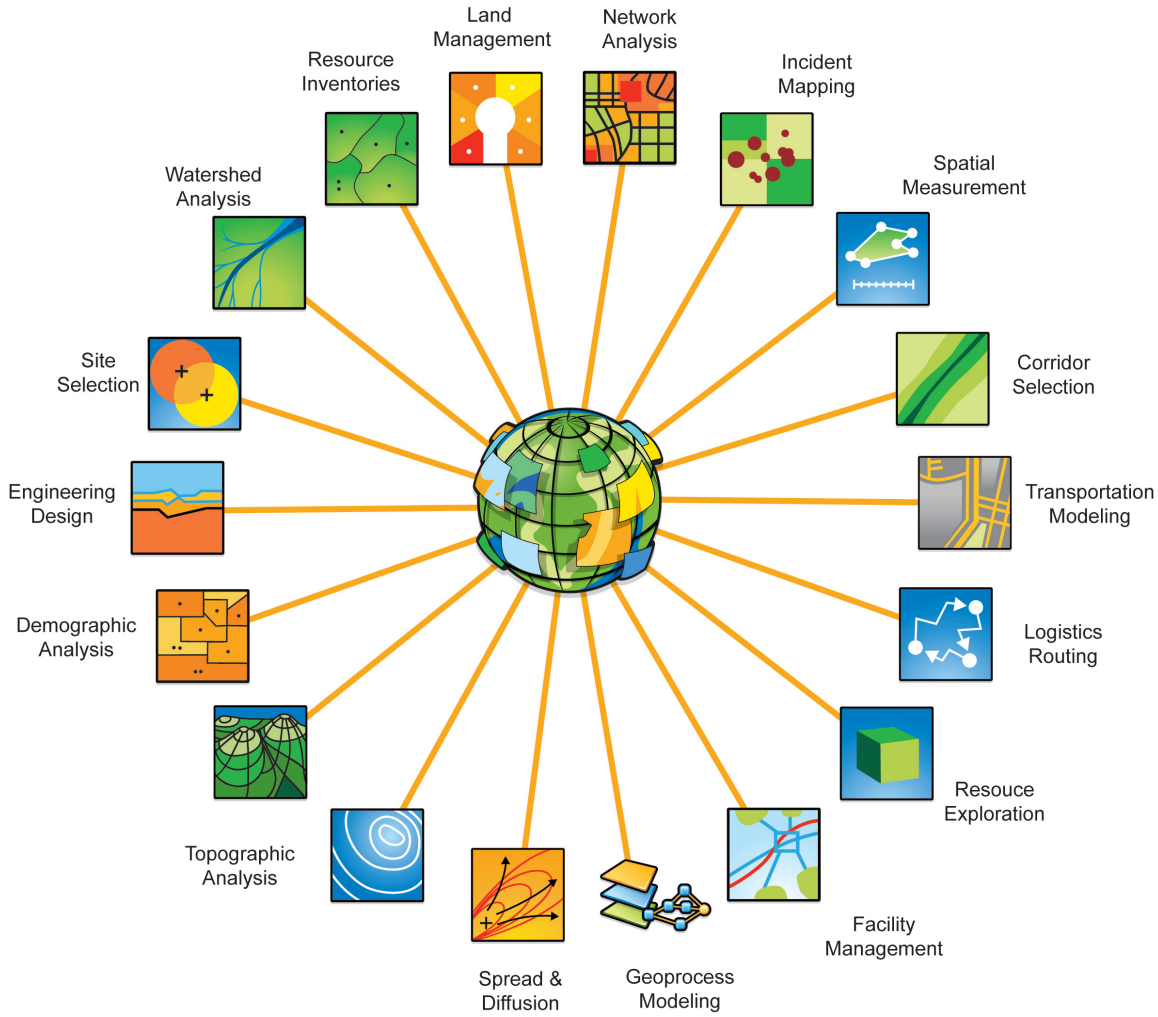
GIS helps us better understand our world so we can meet global challenges. By applying what we know of science and GIS to what we do not know, we can get to what we really need to know—how to enhance quality of life and achieve a better future. These issues are spatial in nature and require spatial tools and spatial thinking. Creating and applying GIS tools and knowledge allow us to integrate geographic intelligence into how we think and behave. To that end, GIS can govern our relationship with the environment as well as help us perceive intricate relationships that otherwise we would never be able to understand.

Planners engage in a plethora of activities, but their work generally reflects the tension among three main competing interests: equity, economy and the environment, also known as the "three Es." Regardless of their specialty, planners pay a great deal of attention to the notion of sustainability, which encapsulates these three key elements. With this in mind, planners and community developers are in constant search of tools that can balance these often-conflicting interests as well as enhance their ability to make informed decisions that promote collaborative public participation processes and eventually, good urban form. Planners and policy makers are keen to strike the right balance between these three factors. In practice, however, this is easier said than done because one of these aspects usually dominates, causing property, development, or resource conflicts. This creates a problem best known as reactive planning, which often results in precipitous action with disastrous results.



The sustainability triangle of three conflicting planning goals.

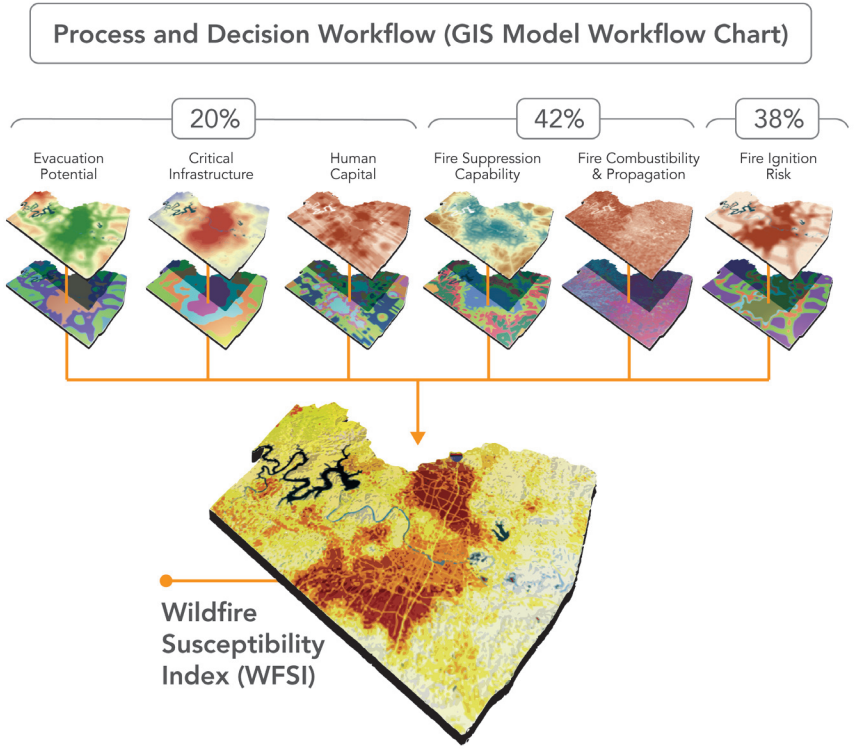
This troubling side of planning and policy making is indicative of the need to rely on new tools and approaches to change the way we think, plan and—most importantly—envision our future. With GIS, we can create new approaches that help us understand the relationship between man and the environment. This calls for more integrated tools that build a holistic and comprehensive approach to resolving planning problems.



GIS is being applied around the world to solve many problems.

Planning *for* People

Traditional practical applications of GIS in planning can be referred to as "planning for people," where planners do the work and make decisions on behalf of the community. This includes asset and facility management and planning for natural and man-made disasters before they happen and mitigating impacts after they occur—for example, modeling areas that are most vulnerable to wildfire to predict where a fire is most likely to happen and preparing to minimize its impact. By using GIS-based, multiple-criteria evaluation (MCE) and applying numerous factors that were consolidated into these criteria, planners can weigh and combine these factors into one layer, showing areas of high wildfire vulnerability. Knowing the population at risk enables planners to determine where to allocate and locate resources most effectively.

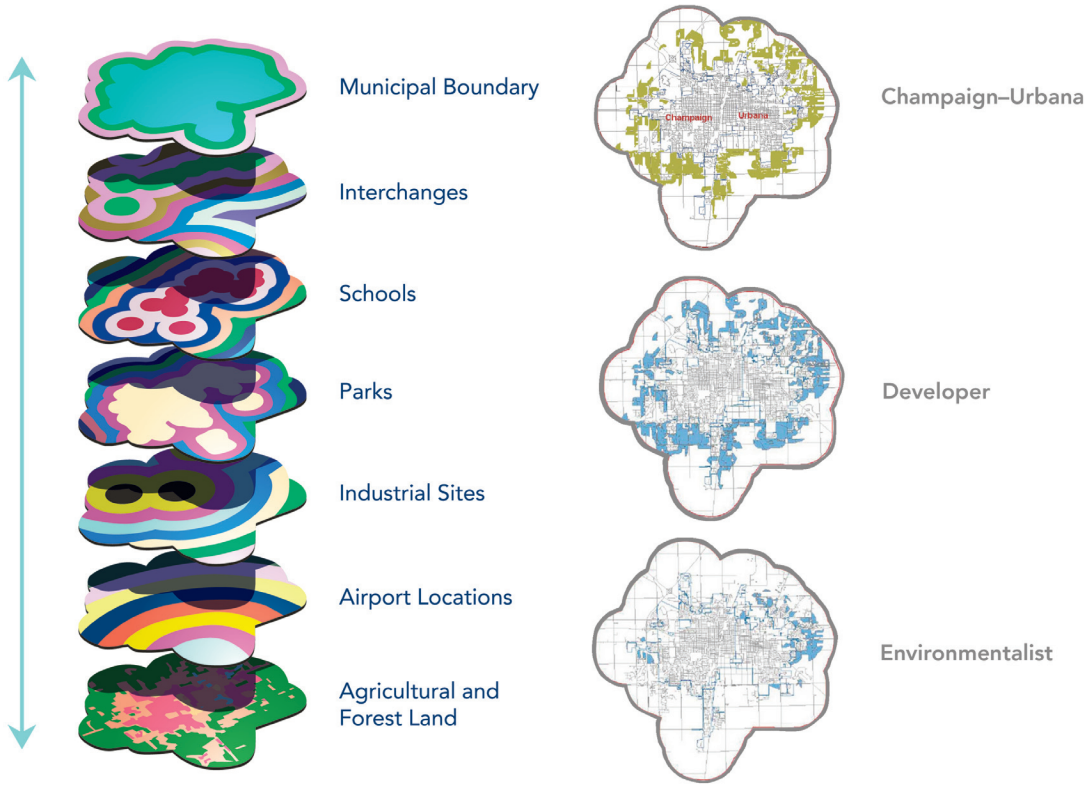


GIS supports wildfire prediction and mitigation.

By integrating geographic data with geoprocessing, modeling and visualization tools, we can evaluate the impact of human activities and land-use changes on the built environment. For example, GIS can be used to evaluate different land-use scenarios based on environmental implications. Adding particular land uses to an existing land-use plan will likely show increased amounts of impervious coverage, which in turn can cause a great deal of runoff and flooding that damage the environment. Using GIS, planners can compare and contrast two scenarios of land-use changes to determine which one is more environmentally friendly and promotes low-impact development.

GIS is also used in economic development, in site selection and suitability analysis, and for finding the right sites to locate new businesses and grow existing ones. Within economic development, GIS is used to support the emerging trend of economic gardening, a new way to foster local and regional economic growth by nurturing existing small businesses in the community.

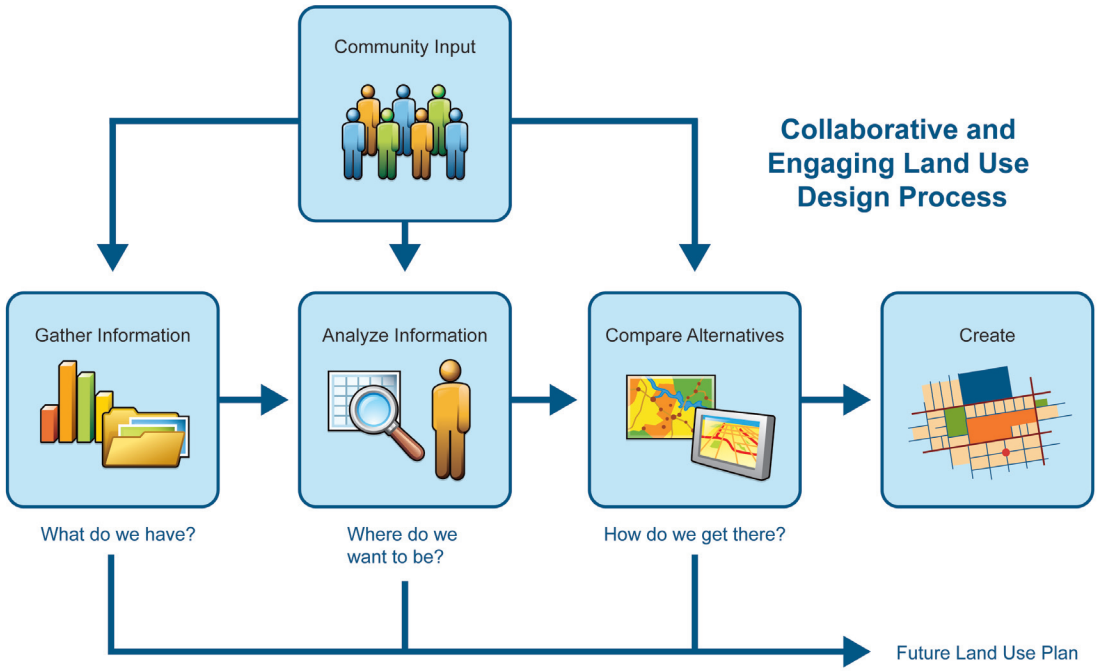
Additionally, planners are deploying GIS to encourage smart growth and promote green and lean cities, sustainable development initiatives, and effective growth management. For example, GIS can be used to determine the best locations for low-density residential development by employing a set of criteria and assigning different weights and values to each individual factor. These weights can reflect whether we are concerned more with protecting the environment or with economic development goals.



Sustainable and effective growth management in Champaign-Urbana, IL.

Planning *with* People

GIS can also be used to promote a more collaborative and engaging way of planning—planning with people. In the context of land-use planning, planners try to determine where we are now, where we want to be in the future, and how we get there. To accomplish desired future conditions with the people, planning is an ongoing process, rather than a product. While creating the plan, planners should seek bidirectional community input to make sure that the process is collaborative and transparent.



Planning with people focuses on seeking public input for future land-use planning.

But how can planners do that? They can follow an emerging trend, Planning 2.0, which has three components or levels of implementation:

1. **Inform** the impacted and interested stakeholders, including the public, by disseminating information and maps through online GIS.

2. **Involve** the public by getting its feedback on proposed projects and land-use changes. This is enabled by crowdsourcing (also referred to as capturing volunteered geographic information), where citizens act as sensors and a source of geographic information.

3. **Empower** the public to make informed decisions about existing and new development.

Using GIS as a collaborative platform empowers both decision makers and the broader community by exploiting the Web as a platform to deliver geoservices, often enabled by cloud computing capabilities and open data sharing policies.

People are using social media to communicate every day and express things that are important to them, so why not leverage social media to empower citizens to make decisions regarding what should and should not happen in their communities? Planning 2.0 incorporates online GIS and social media to support collaborative planning and ongoing public participation. This combination enhances government transparency and accountability by creating a societal infrastructure for human interaction.

What makes planning with GIS an effective and efficient way to achieve a future that we all desire? The answer lies in the ability to visualize development that helps us understand the places in which we live. We can modify development patterns and view results on the fly, and we can show the different impacts of new developments and study the spatial morphology of the urban fabric in two- and three-dimensional environments. Modeling capabilities allow us to apply cutting-edge technology to conservation, economic development and land-use planning and policy making.

Today, GIS technology is advancing rapidly, providing many new capabilities and innovations in planning. This growing technology provides a platform for more efficient and effective planning and decision making—not only mapping and visualization but also modeling, spatial analysis, data management, Web services and mobile solutions. GIS is being used everywhere to help us solve real problems and confront new challenges.

(Reprinted from *Directions* Magazine, January 2, 2011)

Planning 2.0: A Collaborative Platform for Actionable Intelligence

Planners and policy makers must constantly make decisions in the face of uncertainty and ever-changing environmental and socioeconomic realities. Though they must heed the words of elected officials, planners must also listen closely to the citizens they serve. This delicate balance marks a decisive paradigm shift from the tradition of "planning for people," in which planners do the work and make decisions on behalf of the community, to "planning with people," in which planners carry out their work in a more collaborative and engaging way. Planning with people requires involving communities from the very onset of the planning process in a manner that is comprehensible, transparent, legitimate, and interactive.

Today's changing communications landscape—especially the pervasive use of mobile devices and social media—has created new realities and challenges and offered new opportunities to engage citizens in the planning process. Effectively engaging citizens requires the use of collaborative decision-making platforms for actionable intelligence. Planners must effectively exchange information with their entire communities outside traditional in-person community meetings and planning forums. This does not mean replacing the traditional civic engagement processes but rather complementing and reinforcing them with more sophisticated ones that offer resilience and ongoing involvement.

What Is Planning 2.0?

This emerging trend is referred to as Planning 2.0, which incorporates online geographic information system (GIS) mapping and web technologies to support collaborative planning and ongoing public participation. This enhances government transparency and accountability by creating a societal infrastructure for human interaction. Planning 2.0 helps us cast our net as far as possible to capture as much public feedback as needed and foster public involvement. This entails retooling our communities with effective means of communication that go way beyond the traditional civic engagement venues to a more open and capable dialog and transparent participation. Planning 2.0 has three components, or levels, of implementation:

1. Informing impacted and interested stakeholders, including the public, by disseminating information and maps using the GeoWeb as a common platform. Providing meaningful and relevant content about the planning problems and issues impacting the community is crucial not only in informing citizens and community groups but also in getting them interested and

involved in the process. The GeoWeb efficiently exchanges community information, provides real-time insight, and reaches more of the public than could possibly attend a town hall meeting.

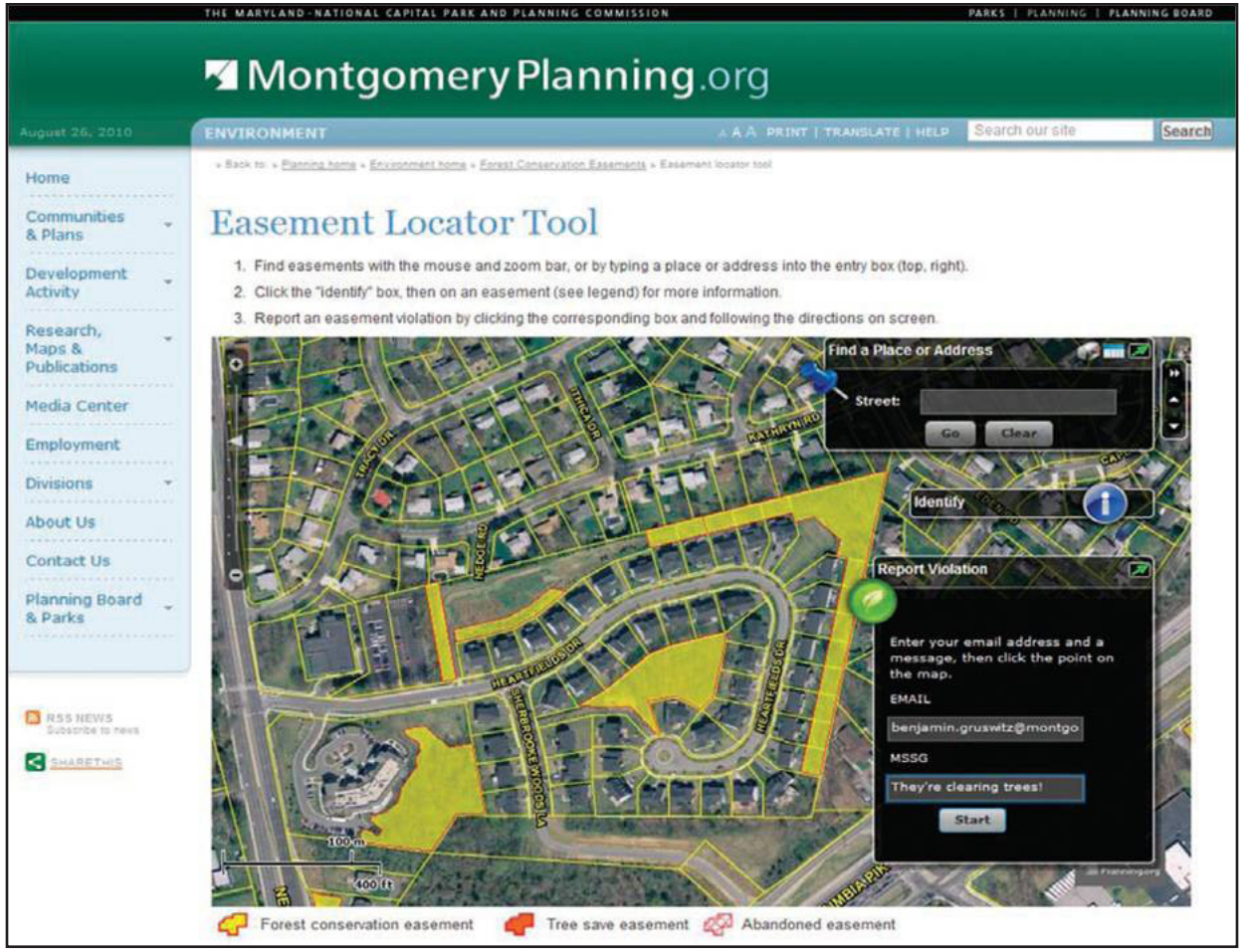
2. Involving members of the public by getting their feedback and quickly registering their preferences regarding planning initiatives, from broad issues such as community visioning to specific project-based proposals and land-use changes. This is enabled by crowdsourcing, through which citizens act as sensors and a source of geographic information and intelligence.

3. Empowering the public to make informed decisions about new and existing developments. By using the web, cloud computing, and open data-sharing policies as a platform to deliver geoservices, people are able to make decisions regarding what should and should not happen in their communities. This provides a collaborative platform that empowers both decision makers and everyday citizens.

Practical Applications

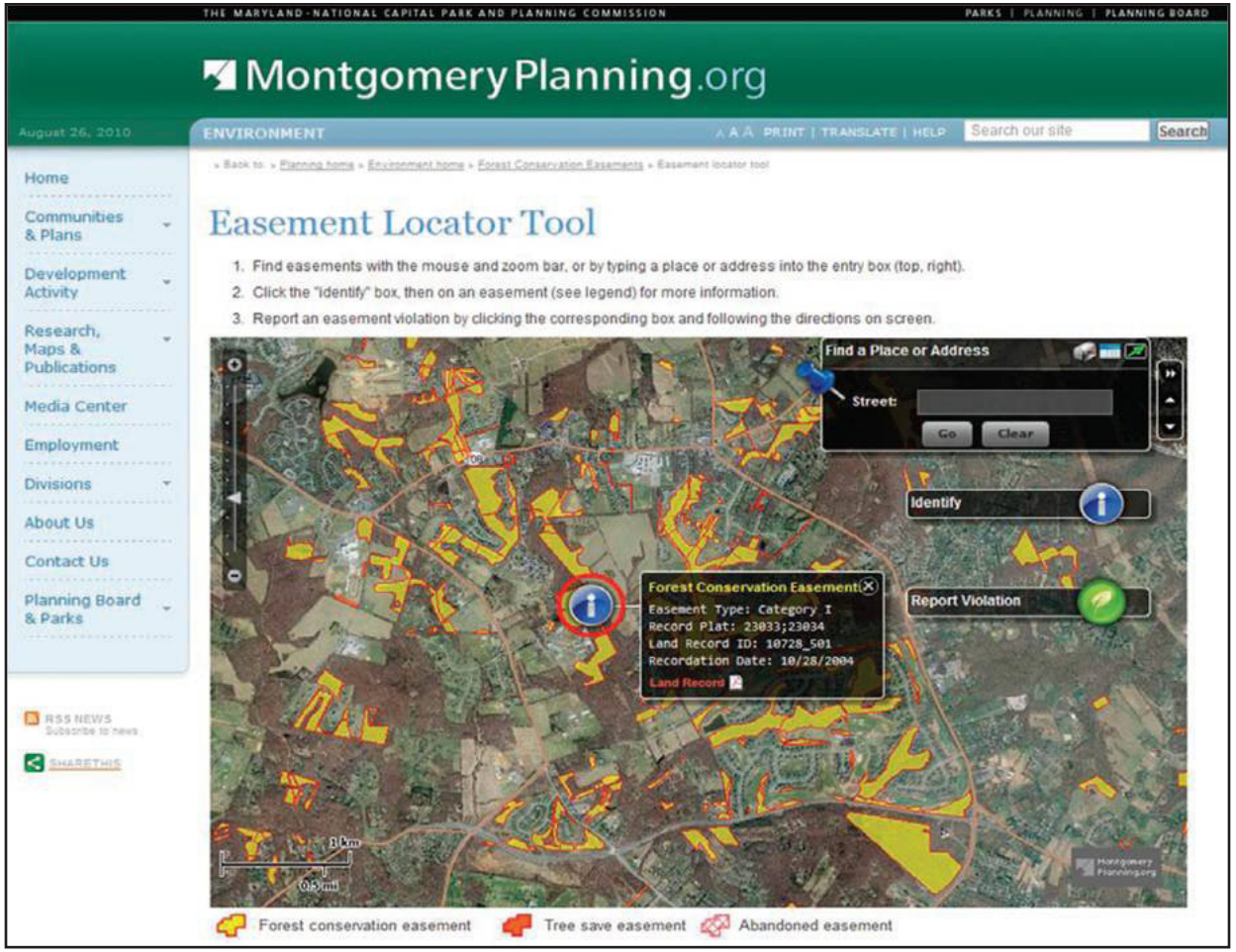
How can planners leverage Planning 2.0 to connect with their communities? Many communities today have realized the importance of integrating Web 2.0 technologies into planning processes; following are some examples:

Informing and involving the public: Montgomery County, Maryland, created an online Planning 2.0 tool to help track and enforce easements for forest conservation on private land. Conservation easements are one of the planning methods used to preserve prime farmland, forestland, and sensitive natural areas. This method separates ownership of the land from the right to develop it. The idea of this project is to enable the public and property owners to easily view aerial images of their easements and access information about them such as relevant legal documents.



Visitors to the site can click a forest conservation easement (yellow) and report a violation directly to the planning department.

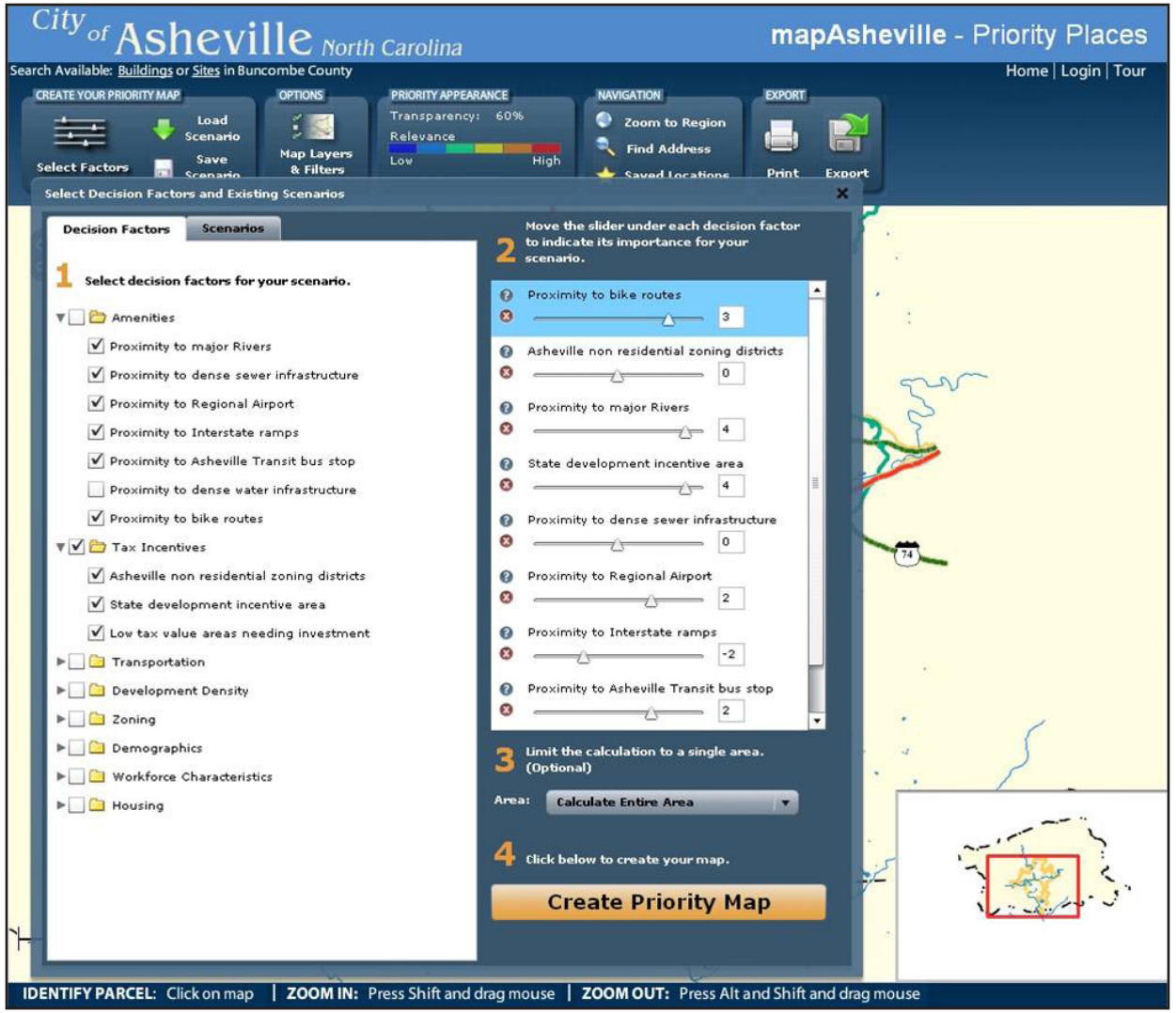
The public is able to provide comments by clicking a particular easement on the map and can submit questions or report possible violations. These comments (along with the location) are sent to the planning department's tracking system, which instantly alerts the planning staff of a violation and quickly generates a return confirmation. Esri's ArcGIS Desktop and ArcGIS Server are used to manage, analyze, and visualize this data.



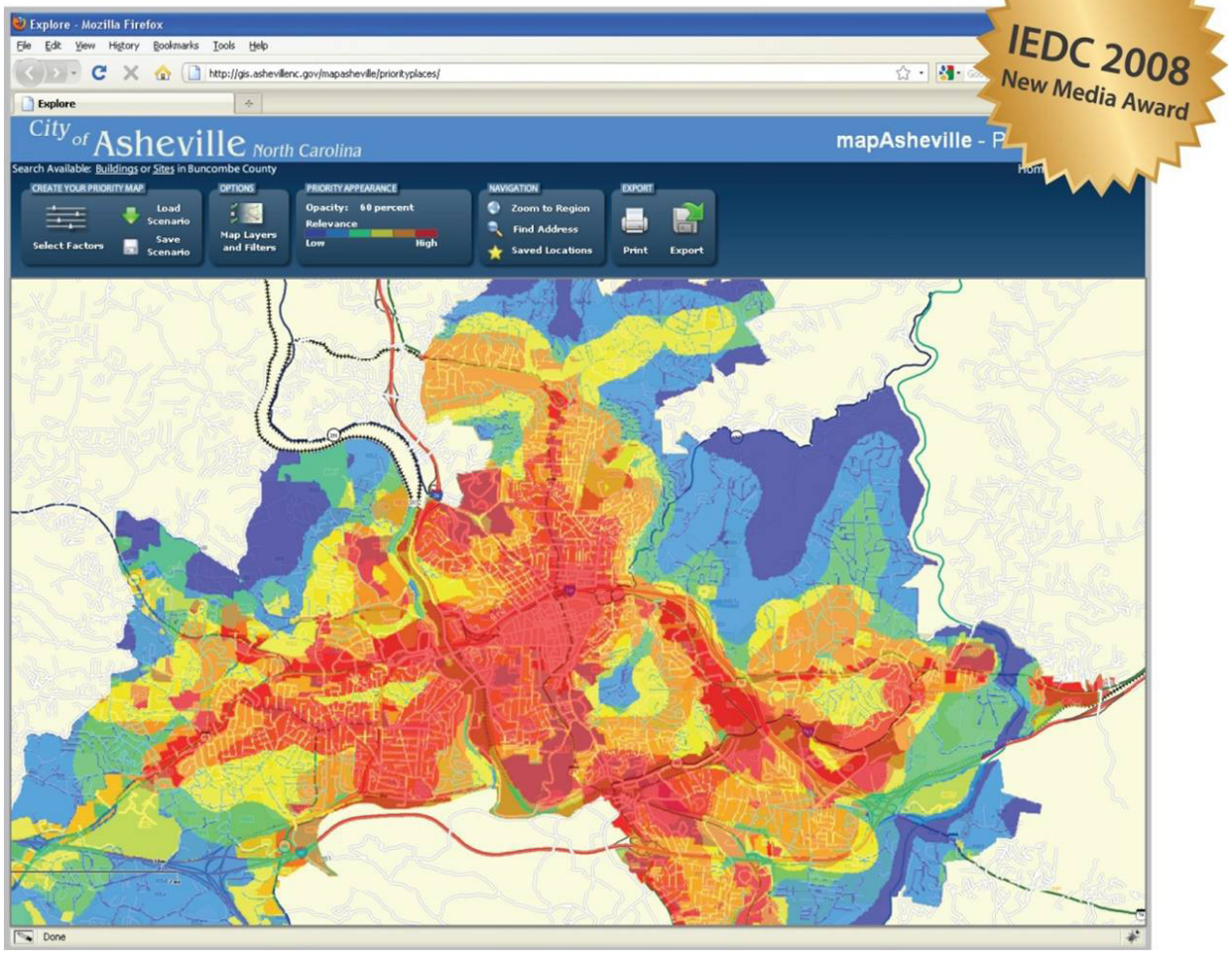
Selecting a forest conservation easement (yellow) with the Identify tool reveals important parcel information including a PDF of the land record.

Empowering the public: An online application, Priority Places, is an example of empowering the public to make decisions about finding the best places to live and work (namely site businesses). Created by Esri's partner Azavea, it supports interactive planning in a way that both leverages the investment in GIS technology by the City of Asheville, North Carolina, and empowers citizens and entrepreneurs to make better decisions about where they live, work,

and invest. People can select from several indicators, assign weights to each of them, and generate a map showing hot spots reflecting places that meet specific quality of life indicators and business requirements.



Citizens and entrepreneurs can select their decision factors and assign weights to each factor to reflect its importance.



A priority map shows the best locations (in red) suitable to live, work, and site businesses based on a selected scenario.

This emerging Planning 2.0 environment aims at bridging the civic engagement and communication gap by fostering bidirectional participation between planners and citizens. Open, accountable, interactive government means that citizens are now empowered in bold new ways to help shape the decision-making process and define future conditions. The challenge for planners today is to embrace and leverage Planning 2.0 capabilities to help them share and connect, creating people-oriented places that are shaped by people-oriented decisions.

(Reprinted from *Next American City* magazine, January 18, 2011)