

The theme for the 29th Annual ESRI International User Conference was GIS: Designing Our Future. Here, ESRI president Jack Dangermond explains GeoDesign and its importance.

The Vision of a Purposefully Designed Future

This year's conference emphasized the interesting relationship between design and GIS, with particular emphasis on the concept of "GeoDesign."

Today, GIS professionals work with geographic information to manage many aspects of our world and disseminate their good works. Design is a discipline and process where people deliberately create. Design is about purpose and intentions; it's about seeing in our mind's eye what could be, then creating it. GIS can also be used to integrate geographic science with design. I like to refer to this as the field of GeoDesign.

One of the big challenges facing our society today is the rapid change that humans are making to our global environment. While there are certainly many amazing advances taking place in areas such as technology, health care, and basic scientific understanding, we are also severely impacting our natural environment—the foundational infrastructure for sustainable life.

These changes are largely the result of uncoordinated, unguided human activities. Our landscapes are becoming more fragmented; depleted; polluted; eroded; and in some cases, actually disappearing, becoming extinct. This is a tragedy for our future, and it's happening largely because we are not consciously designing our future, and we are not evaluating and accounting for the long-term impacts of our actions on our communities, our environment, our society, our climate—our world.

My message is simple. We need to move from a future that simply happens to one that is purposefully designed, with a full understanding of the consequences. This will take many participants and more conscious and collective action; action guided with our best vision, science, and intentions. We need to design our future while fully accounting for the consequences of what we do.

I believe GIS and GIS professionals hold the promise for accomplishing all this. GeoDesign is a systematic methodology for geographic planning and decision making. GeoDesign starts by incorporating all the geographic knowledge that users collectively build and maintain—layers of information, measurements, and analytic models—and plugging it into a new interactive process where one can design alternatives and get geography-

based feedback on the consequences of these designs right away. What if we do this here? What is the impact of that alternative versus this alternative? This iterative design/evaluation process is fundamentally how the human brain works.

Geographic Sketching

Geographic sketching is the central GIS tool for supporting GeoDesign. This new capability allows users to quickly sketch their design ideas on top of suitability maps and get immediate feedback on the performance or impact of the design being proposed. The GIS framework provides instantaneous feedback in the form of maps, charts, and statistics and enables rapid testing of multiple design services.

Dr. Carl Steinitz, a professor of landscape architecture at Harvard University, first described how the GeoDesign process worked by posing it in the context of six geographic, or landscape, questions.

The first question is How can we describe geography? This is done in a GIS by abstracting geography into a series of inventory data layers. The second question is, How does this geography actually operate? Here, GIS is used to combine data with spatial analysis modeling to describe geographic processes. Examples include soil erosion, land-use and vegetation change, hydrology, or traffic flows. Process models predict or describe how various spatial phenomena change with respect to time. The third question is, How can we alter geography considering all the factors? GIS uses suitability and capability modeling to answer this question. Various map factors are overlaid and weighted relative to their merits for a particular use.

These first three questions describe the world as it is; the following questions describe the world as it could be. What are the alternative scenarios for designing the future? This involves sketching out the options. Then, How can we quickly evaluate the consequences of those changes? Here, GIS can be used to evaluate the impacts of each alternative. Lastly, How should geography be changed? This integrates considerations such as policies and values into the decision-making process.

The concept of GeoDesign integrates all six of these steps, providing us with a rapid, adaptive process for creating a more sustainable future.

GeoDesign Will Extend into Every Field

GeoDesign is an evolutionary step in the GIS field. While very exciting for land use and environmental planning, GeoDesign has broad implications for virtually all professions. This methodology will be applied in many fields—by retailers who want to understand the consequences of opening or closing stores; by engineers who want to locate a road in the right location; by utilities, farmers, foresters, law enforcement, energy companies, and military, to name just a few. This approach will move GIS beyond simply describing the world as it is toward the idea of creating the future, integrating geographic thinking into all the work we do.

GIS professionals will chart out the future using GeoDesign maps. These maps will become a new language for us to communicate and evaluate the future, showing the world as it could be, encapsulating geographic knowledge with purposeful design. This process is about bringing information and science into the way that we make decisions. Our new president is fond of saying he wants to put science in its rightful place. This is where I think its rightful place is—supporting the creation of the future with new kinds of maps that bring it all together.



Meeting on the Future of GIS and Design

The world's first GeoDesign Summit will be held January 6–8, 2010, at ESRI in Redlands, California. A diverse group of GIS professionals and academics will explore methods for advancing the integration of design and GIS technology. The event is sponsored by ESRI, the University of Redlands, and the University of California at Santa Barbara. The list of speakers includes Grant Jones, Bran Ferren, Carl Steinitz, Tom Fischer, Kim Tanser, and Michael Goodchild. Visit www.geodesignsummit.com for more information.