

# SPATIAL DELPHI: Geo-Collaboration and Participatory GIS in Design and Planning

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One of the fundamental aspects that is rapidly changing in design and planning is the process itself by which designs are generated and developed. In this transition, the design process itself—rather than its output—is becoming the focus of design and planning products. This is particularly true in those design and planning challenges at the larger city and regional landscape scale, which my position refers primarily. This change supposes fundamental transformations in which the “designer agency” is expanded to incorporate new actors and players, which must be able to manipulate, interpret and propose spatial concepts. In this regard, the product(s) of design processes is also reformulated and re-interpreted to accommodate a new set of values. The intention behind those new design and planning products is to become more dynamic in order to accommodate emerging and rapidly changing values, circumstances that characterized our constantly changing societies and environments. I argue through this position paper that this transformation provides an important opportunity to generate, reformulate GIS with design and planning.

There are two fundamental conditions that I consider to be aligned and which can propitiate a necessary tided-coupling between design and GIS. First, there is an established awareness of the increasing complexities designers and planners deal with today and the inefficiencies of traditional tools, methods, and ultimately education have in assisting the generation of robust solutions. This awareness comes from a renew alignment and emerging re-established relationships of design and planning to fields such as ecology, geography, energy, and phenomena such as the global market economy and climate change. It represents a reaction to the recent claim made by design disciplines on the larger territorial subjects traditionally associated with geography and planning (Waldheim, 2008). In this regard concepts of adaptive management and complex systems are invading the vocabulary of designers and planners and serve as evidence to new dimensions of the design agency.

Second, there are the demands placed on design and planning by the changing relationship between governments, the market and civil society, which demands new social and professional processes by which design is approach and solutions are developed. This indeed has resulted in the ultimately displacement of “inter” and “multi”-disciplinary approaches to more democratic and enfranchising “transdisciplinarity” approaches.

Processes that are today rapidly institutionalized from global multi-lateral institutions to local policy agencies. Under the transdisciplinary model, planning may become more integrated with research, enabling the multidimensional challenge of sustainability to be understood more rigorously with many disciplines involved, and the public (i.e., stakeholders, elected officials) are similarly involved in planning and decision making.

In summary the “knowledge base” designers and planners must employ to develop their propositions have been expanded while processes to synthesize knowledge—for the basics of efficiency and clarity—have increased in complexity. This has occurred by incorporating a number of new players in the design process which spatial thinking and synthetic capabilities need to be recognized.

My position—based on the conditions previously mentioned—argues that one of the most important aspects for the integration of GIS in design and planning is the support of spatially-explicit collaborative and participatory design processes. I suggest that in order to accommodate the emerging complex systems nature of design problems and the transdisciplinary demands placed upon the new design agency, we need to incorporate the concept of “Spatial Delphi.” Spatial Delphi suggests a model for more collaborative and participatory design practices which is examined and *instrumentalized* through geospatial systems and technologies (GIS). The Delphi method<sup>1</sup> is based on the assumption that group judgments are more valid than individual judgments. Participation in this context entails integrating a variety of stakeholder positions into the design and planning processes to propitiate more democratic and inclusive solutions aiming to integrate their vision and knowledge into decision making.

While it is recognized that participatory-based design and planning approaches have considerable advantages over traditional planning and design practices, they by definition require the participation of a diverse group of citizens and other agents, many without scientific, design or physical planning background. These conditions place a challenge but also an opportunity to re-conceptualize the integration of spatial concepts to a wider group of users. In particular, citizens, non-governmental organizations and firms have become more and more critical and self-confident in defining their needs, ideas and wishes, which in turn

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<sup>1</sup> The Delphi method was developed at the beginning of the cold war to forecast the impact of technology on warfare (Helmer & Dalkey, 1999). In 1944, General Henry H. Arnold ordered the creation of the report for the U.S. Air Force on the future technological capabilities that might be used by the military. Two years later, Douglas Aircraft Company started Project RAND to study “the broad subject of inter-continental warfare other than surface” (Brown, 1968). Different approaches were tried, but the shortcomings of traditional forecasting methods, such as theoretical approach, quantitative models or trend extrapolation, in areas where precise scientific laws have not been established yet, quickly became apparent. To combat these shortcomings, the Delphi method was developed by Project RAND during the 1950-1960s (1959) by Olaf Helmer, Norman Dalkey, and Nicholas Rescher (Rescher, 1998)

contributes to the growing complexities of spatial planning and design and the increasing amount of information that need to be processed (Van Den Brink, Van Lammeren, Van De Velde, Dane, & (eds.), 2007).

Through my research I have explored some of the conditions laid out earlier in the paper which I consider representative of participatory and collaborative Spatial Dephi. In particular I developed during my doctoral dissertation directed by Carl Steinitz at the Harvard University Graduate School of Design, a framework that integrates participatory planning methods (particularly participatory mapping (PM), with GIS tools. The system was employed to solve the complex design problem of planning for conservation and development in a rapidly changing and contested regional landscape.

Fieldwork conducted in the Osa Region of Costa Rica, captured through multiple community and individual participatory mapping workshops, land use distributions from 40 participants representing two groups: 1) stakeholders from the region of study called “local experts,” and 2) participants from academic, scientific and government groups called “non-local experts.” The study captures in real time, digital land use allocations from each stakeholder employing a framework for direct geospatial scenario digitization. I employed digital pen and interactive display screen technologies over a full portable GIS operating from a laptop. Results captured directly in the geodatabase, are analyzed and presented back to the all participants allowing multiple rounds of scenario refinement, and knowledge and information exchange. The method generated two important advances in transdisciplinary-oriented design and planning practice: First, it allows stakeholders to directly sketch land use change scenarios in a collaborative and participatory manner in a Delphi Method into a geodatabase for further evaluation through spatial statistical analysis. Secondly, it allows the exchange of information and knowledge about the management and associated impacts of alternative uses of land resources, among decision-makers (government), scientist, and local community and regional groups. Final results define and categorize through an indicator system, geographic areas presenting different levels of spatial agreement and disagreement—both of land use types and stakeholder groups. This method proved highly informative for national and local planning authorities, scientist and local groups, improving capacity building, governance and ultimately informed decision making.

Based on this research I suggest here that If GIS ought to serve as medium for the exploration of spatial concepts in design and planning problems where various “design agents” have to manipulate and explore spatial concepts. Sketching, diagramming and 3-D modeling are among the most useful mediums of inquiry and exploration in design and planning. GIS must integrate conceptual ways to manipulate space in the way we do manipulate other mediums of design inquiry and enhance them through analytic support.

ESRI began few years ago to explore the possibility to “sketch up” in GIS. The result was ArcSketch 1.1™, a sample extension to ArcGIS that allows the user to quickly create, or “sketch,” features in ArcMap using easy-to-use drawing tools and symbols. In my teaching I use Sketch Up with design and planning students not as a way to enter data into a

geodatabase, but rather as a way to explore spatial concepts over geography in rapid fashion. There are a series of limitations in terms of relating spatial entities as you do in design processes, although the basics are there. My current research and teaching explores a combination of spatial concepts in regional landscapes through ArcSketch but linking back to model-builder models that function as services through ArcGIS Server. We are testing these methods in a course I co-teach with Prof. Michael Flaxman at the MIT Department of Urban Studies and Planning. This is allowing us rapidly explore design ideas and to link back to the analytics of GIS modeling to be able to inform and design propositions.

Ultimately, the explorations I conduct in my research and teaching, respond to the international escalating institutionalization of participatory development and planning and design which demands from today's designers a new "expert-facilitator role"; a role which aim is to contribute in the mediation and advice of the complex system debate of land resource design and planning between experts and non-experts in a collaborative manner where the idea is to co-generate better knowledge for design.

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