: What is a Spatial DSS?

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Web-based systems like Google Maps and MapQuest have demonstrated the importance and value of having spatial decision support. But what is the difference between a Geographic Information System (GIS) and a Spatial DSS, and how is Spatial DSS related to DSS in general? These questions ask broadly about terminology distinctions. In the past 10 years, spatial and location-based applications have expanded with the widespread availability of smart phones with global positioning system (GPS) technology and expanded Internet capabilities. GPS, a satellite-based navigation system, provides location awareness for applications. Organizations have the potential to collect and use extensive spatial data; a spatial DSS provides access to and analysis of the data.

Peter Keenan, at the Spatial DSS web page, notes "Spatial DSS refers to those systems based on the use of Geographic Information Systems (GIS) technology. GIS provides an important source of tools and techniques which can usefully be incorporated in a DSS which makes use of geographic or spatial data." His definition sets the stage for understanding this increasingly important subtype of DSS. Developers must realize however that there are varied definitions of GIS and a variety of GIS technologies.

For example, Tomlin argues GIS "is a facility for preparing, presenting, and interpreting facts that pertain to the surface of the earth. This is a broad definition. A considerably narrower definition, however, is more often employed. In common parlance, a geographic information system or GIS is a configuration of computer hardware and software specifically designed for the acquisition, maintenance, and use of cartographic data (p. xi)."

The ARCINFO software view is that a GIS is "an organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information." This definition is from Understanding GIS: The ARC/INFO Method (1990).

The Spatial Decision Support Knowledge Portal hosted at the University of Redlands claims "Spatial decision support is the computational or informational assistance for making better informed decisions about problems with a geographic or spatial component. This support assists with the development, evaluation and selection of proper policies, plans, scenarios, projects, interventions, or solution strategies." The portal includes a number of interesting application case studies.

At DSSResources.COM, most Spatial DSS are *generally* identified as a sub-category of data-driven DSS. Data-driven, spatial DSS use Geographic Information Systems technologies to support managers in analyzing data coded with a geographic or spatial reference. Some spatial DSS have a model as the dominant component that provides the functionality of the system and hence are better classified as model-driven, spatial DSS.

DSSResources.com includes two model-driven Spatial DSS case studies, Tomaszewski (2005) with plume modeling and Sugumaran and Meyer (2003) for environmental planning and management. The Messak (2003) case is a more traditional data-driven, spatial DSS for fire and emergency medical service.

Tomaszewski reports a pilot application that integrates the "Environmental Protection Agency (EPA) Aerial Locations of Hazardous Atmospheres (ALOHA) program with MapObjects and ArcView technologies to provide rapid, real-time modeling and reporting for chemical plumes and the areas that they affect."

Sugumaren and Meyer report a "Web-Based Spatial Decision Support System (WEBSDSS) prototype to prioritize local watersheds on the basis of environmental sensitivity using a multiple criteria evaluation model for the City of Columbia, Missouri."

Messak's article "illustrates how GIS and Global Positioning System (GPS) tools are being implemented in a small county in upstate New York. This case study documents the project from initial inception in a single fire district to a county-wide expansion. Topics covered in this article include using GIS to develop predetermined Helicopter Landing Zones, mapping a fire district's water sources, storing floor plans of a building prior to a fire for use in developing fire fighting tactics, emergency preplanning in the event of an evacuation in a natural disaster and developing a preplan mapping of all fire departments in the county including available resources."

Reference

Keenan, P., "Spatial Decision Support Systems," AISNET, URL http://home.aisnet.org/displaycommon.cfm?an=1enbr=422 .

Messak, M., "Decision Support for Mayfield, NY Fire and Emergency Medical Services", 2003,

posted at DSSResources.COM November 28, 2003, URL http://dssresources.com/cases/mayfield/index.html.

Sugumaran, R. and J. Meyer, "Building a Web-Based Spatial Decision Support System (WEBSDSS) for Environmental Planning and Management", 2003, posted at DSSResources.COM June 14, 2003, URL http://dssresources.com/cases/websdss/index.html

Tomaszewski, B., "Erie County Emergency Response and Planning Application Performs Plume Modeling", posted at DSSResources.COM March 6, 2005, URL http://dssresources.com/cases/eriecounty/index.html

Tomlin, C. D., Geographic Information Systems and Cartographic Modeling. Englewood Cliffs, NJ: Prentice-Hall, 1990.

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