Chapter 90
Using Geospatial Information Systems for Strategic Planning and Institutional Research

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ABSTRACT

This chapter will address the use of Geospatial Information Systems (GIS) for institutional research and strategic planning departments. Throughout the chapter GIS will be examined for its applied purposes as well as answering basic research questions. This chapter will provide examples on how GIS can be used to answer certain questions and provide analysis to research. By using GIS, institutional research and strategic planning offices can use location as a variable to obtain answers on certain types of questions that can be useful to university administrators and government officials attempting to construct policies and procedures for their institutions. GIS can also be used by institutional research and strategic planning departments for requests from upper administrators in colleges and universities as well as external requests.

BACKGROUND

Many institutional research offices primarily focus on traditional statistical and analytical tools to provide data for assessing, developing or modifying institutional policies. However, geospatial information systems, or GIS, can add a geospatial component to existing data sources to provide in-depth analysis on a wide array of research topics (Ormsby, Napoleon, Burke, Grossl, & Bowden, 2008). A suite of software tools introduced by ESRI in 1997 called ArcGIS has been useful for analytical purposes because it not only compiles and displays large amounts of data but can also plot these data onto maps, which can be particularly useful when analyzing demographic data. (ESRI, 2010). This chapter will discuss the implementation and use of GIS at The University of Texas at Dallas in the Office of Strategic Planning and Analysis (OSPA).

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Geospatial Information Systems

GIS is a set of tools that can use and layer multiple data sources by geographical location. Developed in the mid-20th century, GIS is primarily used in cartography, urban planning, emergency management, resource management and navigation to name a few. The roots of GIS can be traced back to a graphic developed by John Snow in the 1840's plotting cholera deaths onto a map of London, thus demonstrating to city officials that a contaminated water pump on Broad Street was the source of the outbreak (Crosier, 2009). GIS uses an object (a bundle of data and procedures for use) called a GIS layer file (referred to as coverages, shapefiles or geodatabases) that provides an overall framework where the analyst can overlay multiple data streams into one massive dataset, often called a geodatabase. B. Grant McCormick notes:

A presumption is that key benefits of GIS are to be realized with a system that permeates the enterprise, links divisions, integrates data sources to create new understanding, and creates efficiencies by overcoming territorial boundaries. With this in mind, the term GIS should be seen not solely as the use of GIS software, but rather as a technical framework for integrating disparate datasets, bridging software formats, and responding to a plethora of administrative needs and goals. (McCormick, 2003, p. 63)

A geodatabase can contain several layers of data. For example a geodatabase can utilize a satellite photo that is geo-referenced to a particular location, a data file of addresses or ZIP codes, and a computer-aided design (CAD) file. All of the images and data would constitute one geodatabase which could then be used to provide a variety of data analysis. The ability to effectively use massive amounts of data (or utilize a database) with imagery is why GIS can provide powerful analytical capability. In addition, GIS can be used to provide campus planning departments with overlays of future construction. Buildings, infrastructure, and transportation routes can be constructed by a GIS analyst as a layer on top of an existing satellite image. Furthermore, ArcGIS has the ability to render or capture landscape features as well as any other object in a three-dimensional context.

SETTING THE STAGE

GIS at The University of Texas at Dallas

The University of Texas at Dallas is a research intensive university that became part of the The University of Texas System in 1969. The institution emphasizes science, technology, engineering, and mathematics fields (STEM) as well as business administration, developmental and cognitive sciences, public affairs, and unique and growing programs like geospatial information sciences and arts and technology. The university enrolls nearly 16,000 students and is currently undergoing expansion in faculty, staff and facilities. The university's Office of Strategic Planning and Analysis (OSPA) compiles state and federal reports, fulfills external data requests, provides analysis and benchmarking for university administrators and has developed unique software packages like the Logistical Tracking System (LTS). LTS utilizes GIS to accurately account for facility information as well as enable other departments to track assets for operational use, federal reports and state reports.

LTS was originally created to accurately record facility data in the university's mainframe-based space management system (SMS) and to replace an older, interim system based on Microsoft Access® called the Space Inventory Database (SID) (Valcik, 2003). University personnel wanted to create highly accurate and detailed campus maps and floor plans from the room and building dimensions already stored in SMS and SID. Existing software products that managed facility information through computer-aided design