GIS Overview

The following sources of information are provided to give general information and a brief overview regarding Geographic Information Systems (GIS) and how it is used.

SOURCE 1: FHWA Website

Excerpt from www.gis.fhwa.dot.gov

What is GIS?
Geographic Information System (GIS) is a collection of computer software, hardware, data, and personnel used to store, manipulate, analyze, and present geographically referenced information. Spatial data and associated attribute information can be layered on top of one another for viewing and analysis.

Why is GIS important to FHWA?
Geographic Information Systems (GIS) is important because it supports agency priorities and strategic goals, not only within FHWA, but also at the state and local levels. GIS is also important to FHWA because it can improve the environmental review process and can further integrate planning and project development activities. Incorporating GIS into transportation activities allows for project alternatives to be effectively and efficiently evaluated in response to public or agency comments. Project alternatives can then be continuously compared and appraised. This ultimately leads to a streamlined review process and helps to achieve one of FHWA's Vital Few Environmental Goals.

Background of GIS in Highway Transportation Planning.
For several decades, FHWA has recognized GIS as a tool that can integrate information from different sources and enable better and more efficient decisionmaking. In the early 1990s, GIS was used in the development of the National Highway Planning Network (NHPN), a network database of the nation's major highway system, which is currently being used to maintain the National Highway System (NHS) and the Strategic Highway Network (STRAHNET). Around the same time, existing FHWA databases, such as the Highway Performance Monitoring System (HPMS) and the National Bridge Inventory (NBI) , were modified so that they could be "joined" (or linked) to the spatial data in the NHPN. This functionality enables visual display of these data. In simple terms, this means that instead of viewing the data in tabular form (e.g., in a spreadsheet), users can instead make maps to display the data spatially and observe geographic patterns. In addition, users can view particular data items within databases to customize visual display for particular uses. Examples of uses for the NHPN system include viewing traffic volumes or pavement condition on a particular highway or mapping bridges with low clearances in a given state or county.

SOURCE 2: FHWA Resources: Transportation Planning Newsletter

http://www.fhwa.dot.gov/resourcecenter/teams/planning/tpu9.cfm

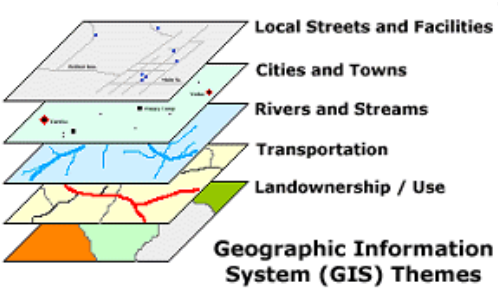
What is Visualization in Planning?
To strengthen public participation in the planning and project delivery process and specifically to aid the public in understanding proposed plans, the SAFETEA-LU calls for States and MPOs to use visualization techniques. Through visual imagery, the complex character of proposed transportation plans, policies and programs can be portrayed at appropriate scales -- state, region, local area, project architecture, etc. and from different points of view. The effective presentation of a project’s impacts to the public has become an increasingly essential part of the planning and design of the transportation system. Examples of visualization techniques include sketches, drawings, artist renderings, physical models and maps, simulated photos, videos, computer modeled images, interactive GIS systems, GIS based scenario planning tools, photo manipulation and computer simulation. New technology has changed the communication process. There is so much data available that interpretation of it would be difficult for anyone, especially if the user doesn’t specialize in that field of expertise.

SOURCE 3: MapCruzin.com

http://www.mapcruzin.com/what-is-gis.htm

What is GIS?
Maps have been used for thousands of years, but it is only within the last few decades that the technology has existed to combine maps with computer graphics and databases to create geographic information systems or GIS. The themes in the above graphic are only a small example of the wide array of information that can view or analyze with a GIS.

GIS is used to display and analyze spatial data which are tied to databases. This connection is what gives GIS its power: maps can be drawn from the database and data can be referenced from the maps. When a database is updated, the associated map can be updated as well. GIS databases include a wide variety of information including: geographic, social, political, environmental, and demographic.



GIS uses layers, called "themes," to overlay different types of information, much as some static maps use mylar overlays to add tiers of information to a geographic background. Each theme represents a category of information, such as roads or forest cover. As with the old mylar maps, the layers which are underneath remain visible while additional themes are placed above.

How GIS Works

It is estimated that approximately 80% of all information has a "spatial" or geographic component. In other words, most information is tied to a place. So when making decisions about sitting new facilities, creating hiking trails, protecting wetlands, directing emergency response vehicles, designating historic neighborhoods or redrawing legislative districts, geography plays a significant role.

This is where GIS comes in. Geographic Information Systems (GIS) technology is a computer-based data collection, storage, and analysis tool that combines previously unrelated information into easily understood maps. But GIS is much more than maps. A GIS can perform complicated analytical functions and then present the results visually as maps, tables or graphs, allowing decision-makers to virtually see the issues before them and then select the best course of action.

Add the Internet, and GIS offers a consistent and cost-effective means for the sharing and analysis of geographic data among government agencies, private industry, non-profit organizations, and the general public.