

Gis in asset and utility monitoring management



CHAPTER II

REVIEW OF LITERATURE

A detailed literature survey pertaining to the application of GIS in Asset and Utility Monitoring, Management is presented in this chapter.

GIS combines location data with both quantitative and qualitative information about the location, letting you visualize, analyze, and report information through maps and charts. Using the technology, we can answer questions, conduct what-if scenarios, and visualize results. GIS is often first identified as a system to manage infrastructure assets and natural resources outside of buildings, but this is only part of the story. Buildings, campuses, military bases, and industrial plants, to name a few, also have geography and can be mapped. It is easier to analyze and manage facility and asset data stored in GIS, making design, construction, and maintenance more efficient and profitable.(ESRI 2010)

Ajwaliya and Patel (2014) has done Design and Development of GIS Based Utility Management System covering 39 acre residential area of staff quarters, DOS housing colony, Vikramnagar, Space Applications Centre (SAC). They identified that GIS can be used in many ways to improve the planning, maintenance and management standards. Developed GIS model has been designed to manage utilities for vikramnagar residential colony. Strength of GIS is integrating data and preparing it for analysis or modeling apart from tying together data from various sources makes it an important tool for the planning and decision making. User can display legend of all layers displayed on the Map.

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P. Smith et. al. (2005) developed Electrical Distribution Model during his research on Electrical Distribution Modeling: An Integration of Engineering Analysis and Geographic Information Systems found that the integration of GIS and power system analysis efforts provides added functionality to the management of utility systems. As competition increases and as information technologies advance, a utility's data becomes more and more valuable as a corporate resource. As a result, sharing information becomes very important to the efficiency of an organization. Though his research a small-scale integration, he highlights the ability of GIS to initiate full integration of electric utility information. The technique of integration and the role of GIS within the envelope of the entire information system can take many forms.

Blachut et al. (1979) remarked that, The availability of detailed and up-to-date cartographic representations of underground utility lines (as water supply, sewage system, electrical grid, gas network, district heating network, telecommunications and wiring network, oil pipelines) is very useful for network facility management, both for private companies and for local administrations.

References from Books: Blachut, T. J., Chrzanowski A. & Saastamoinen J. H. 1979. Urban Surveying and Mapping: 221-234. Springer-Verlag, New York (USA).

Metje et al. (2007) noted that To obtain a sufficiently accurate and complete representation of the underground, a dedicated and extended survey is required. Non-invasive surveying can be performed with traditional topographic methods or by GPS positioning, by measuring the positions of

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the surface elements of the networks, like manholes, catch basins, transformers, hydrants, exchange boxes, etc., and subsequently inferring the presence and the approximate planar location of the buried lines. Another possibility is the GPR (Ground Penetrating Radar) technique.

References from Journals: Metje, N., Atkins, P. R., Brennan, M. J., Chapman, D. N., Lim, H. M., Machell, J., Muggleton, J. M., Pennock, S. R., Ratcliffe, J., Redfern, M. A., Rogers, C. D. F., Saul, A. J., Shan, Q., Swingler, S. G. & Thomas, A. M. 2007. Mapping the Underworld. State of the Art Review. Tunnelling and Underground Space Technology 22(5-6): 568-586.

N. cazzaniga et al. (2012) implemented a geographical DB for the storage of data of underground structures and infrastructures. The structure of the DB has been designed based on an approach oriented to the study of the whole process of designing and laying new elements of a utility line. The results were compliant with the requirements of Italian national regulations. This approach allows a good traceability of all collected and archived data, giving the possibility to reconstruct the complete processing chain from the preliminary design of the utility lines to their laying.

The Fort Pierce Utilities Authority (FPUA) migrated some of its electric CAD operations into GIS and maintains a dual CAD and GIS system. FPUA serve more than 24, 000 electric, 15, 000 water, 12, 000 wastewater, and 4, 700 natural gas customers in Fort Pierce and portions of St. Lucie County, Florida. With the GIS in place, FPUA is working to bring the natural gas and fiber-optic telecommunication service databases into the GIS as well as to integrate them with the water service and wastewater collection GIS.(ESRI 2005)

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The city of Painesville, Ohio's utility services include water, electric, storm water, and sewer services. The city has set up a system for government regulation compliance by using GIS. The windfall of meeting the government requirement is that Painesville's GIS also supports asset management for electric operations, system maintenance and capital improvement planning. (ESRI 2005)

Reliable digital data acquisition, robustness, and ease of use were the requirements stipulated by Swisscom AG when it set out to acquire new GNSS instruments to determine the positions of telecommunication infrastructure in the company's country wide fixed-line network. The first requirement was for the measuring system to provide reliable digital data acquisition to allow data transfer to be extensively automated. Furthermore, the system had to be robust, easy to transport, and able to be used by staff who had no detailed knowledge of surveying. The new satellite-supported surveying system Leica Viva GNSS fulfilled all these requirements - in addition to the GNSS and communications technology, the client was also impressed by the systems' newly designed, easy to use software, Leica SmartWorx Viva.(Schnichels n. d.)

In the past few years the State of Qatar, a peninsula on the Arabian Gulf, has experienced extensive infrastructure development. More than twenty years ago the results of a user needs assessment carried out by the government clearly indicated an enormous need for a fully integrated nationwide GIS. The government then established the Centre for GIS (CGIS) as a department of the Ministry of Municipality & Urban Planning. It is based in the capital Doha and became the official mapping agency of the State of Qatar. Since the end

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of October 2009, many public and private survey and mapping communities have been benefiting from a nationwide Continuously Operating Reference Station (CORS) network.(Saal 2009)

Mary Howard (2014), County GIS Manager has quoted “ we have found excellent return on investment for staffing time during collections as well as the importance of having a reliable end-product.” while collecting data in heavily wooded terrain using Trimble and Floodlight technology. for project consisting of installing a broadband 220 miles of buried fiber cable and 5 wireless relay towers. According to County GIS Manager Mary Howard, a fiber mapping crew used an underground-line-locating device to detect the buried fiber and mark its location. Then a GIS technician recorded the location using the handheld GeoXH unit running Esri ArcPad with Trimble GPSCorrect™ data collection software.(Mary Howard 2014)

Jamil et al. (2012) has tried to evaluate main driver in utility mapping, utility agencies, land surveyors and the land surveying profession to meet the demand and challenges in executing the underground utility mapping in Malaysia. JUPEM has developed a national underground utility database called PADU to act as a repository of reliable and accurate underground utility data comprising power and telecommunication cables, gas, water and sewerage pipes provided by the utility agencies in a systematic GIS approach. The data submitted by the various utility agencies are subjected to various checks and verification processes before they are accepted into PADU. However, these checks reveal data of low quality, inaccurate and insufficient to be used as a reference for excavation works. Issues pertaining to data quality, lack of skill and knowledge and the requirement of legislation <https://assignbuster.com/gis-in-asset-and-utility-monitoring-management/>

on underground utility mapping are some of the challenges faced with regards to underground utility mapping in Malaysia. Various initiatives are now being undertaken to overcome these challenges.

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