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Core Curriculum-Geographic Information Systems (1990)

Title

Unit 55 - Facilities Management (AM/FM)

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Compiled with assistance from Warren Ferguson, Ferguson Cartotech, San Antonio

- [A. INTRODUCTION](#)
- [B. AUTOMATED MAPPING](#)
 - [Automated mapping capabilities](#)
 - [Automated mapping shortcomings](#)
- [C. FACILITIES MANAGEMENT SYSTEMS](#)
 - [Facilities management systems capabilities](#)
 - [Facilities management systems shortcomings](#)
- [D. AM/FM](#)
 - [AM/FM examples](#)
 - [Benefits of AM/FM systems](#)
- [E. CHARACTERISTICS OF AM/FM](#)
 - [Functionality](#)
 - [Organizations](#)
- [F. EXAMPLE - EASTERN MUNICIPAL WATER DISTRICT](#)
 - [Background](#)
 - [System development](#)
 - [System configuration](#)
 - [Map products](#)
 - [Applications development](#)
- [REFERENCES](#)
- [EXAM AND DISCUSSION QUESTIONS](#)
- [NOTES](#)

The slide set contains a few slides that could be used to illustrate this unit.

UNIT 55 - FACILITIES MANAGEMENT (AM/FM)

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[A. INTRODUCTION](#)

- facilities management is a very influential, well organized GIS application area
- has major representation from utility companies - telephone, electricity, gas
 - projects tend to be very large, well funded and critical to the efficient operation of the utility
- umbrella term used by these organizations is AM/FM - Automated Mapping and Facilities Management
- AM/FM is primarily distinguished by the context of applications: utilities, urban facilities management
- AM/FM is an information management tool
 - data used for day-to-day decisions only, is not an analytical tool
 - e.g. maintenance crews use information to locate and repair breaks in service
 - e.g. construction drawings are produced and sent to the field for installation
- AM/FM is the integration of two tools
 - automated mapping produces maps
 - facilities management provides digital inventories of facilities
 - AM/FM links the two to provide geographical access to facility inventories

B. AUTOMATED MAPPING

- with control of different layers of information, provides a variety of ways to output from a single database
 - e.g. by turning on or off layers, a street light map or electrical feeder map could be produced from the same database

Automated mapping capabilities

overhead - Automated mapping

- better map maintenance is a major benefit of automated mapping
 - productivity increases 2 to 10 times over manual methods
 - no problem with physical or content deterioration of maps since they can be produced as needed or as updated
- centralized control is a major benefit to major corporations
 - paper documents are replaced by a central digital store
 - copies can be produced and distributed as and when necessary
 - computerization provides easier but better controlled access
 - in the paper world, when a document was checked out no one else could access the information - elaborate systems were set up to ensure return of the document
 - in a digital world we can control who can access and for what purpose (read

only, edit etc.)

Automated mapping shortcomings

- provides only graphic output, no means of query
 - e.g. cannot obtain attributes of objects
 - e.g. cannot access objects by their attributes
- because objects are not connected topologically, cannot carry out sophisticated analysis of networks
- cannot relate map information to other records

C. FACILITIES MANAGEMENT SYSTEMS

- exist in many organizations

Facilities management systems capabilities

overhead - Facilities Management

- consist of computerized inventories of the organization's facilities
 - capabilities for sorting, maintaining and reporting information
 - e.g. many utilities have pole files containing information on each pole
 - e.g. date of installation
 - many types of reports can be generated
- can maintain a digital representation of the facility network to allow engineering, network analysis in tabular, numeric form (not spatial)

Facilities management systems shortcomings

- no geographic capabilities
 - can generate only alphanumeric reports
 - cannot access records geographically
 - cannot generate geographic reports (maps)
- redundancy must arise if both automated mapping and facilities management systems are maintained, one for mapping and the other for inventory

D. AM/FM

overhead - Automated mapping/Facilities management

- combine automated mapping and facilities management into one system
 - geographic information provides a new window into the facilities database
 - information can be retrieved by pointing to a map image
 - e.g. point to an electrical cable and retrieve kVA (kilovolt-ampere) rating, length, mortality, or list of transformers connected to it

- AM/FM is a very successful marriage of two traditional concepts

AM/FM examples

- locating pole or facility item by street address
- generate reports on street lighting - does it meet standards in specified area?
- generate maps of electrical circuits or feeders at prescribed scale
- produce continuing reports on property
- provide reports for tax purposes

Benefits of AM/FM systems

- reduces the cost to maintain information
 - no physical maps to deteriorate, get lost, misfiled
 - data is more accessible and secure
- impact the organization by integrating operations
 - departments must cooperate because they now share data
 - reduces potential duplication between departments
 - ensures consistency of information base across departments
- new forms of report available
 - new information provides basis for new forms of management

E. CHARACTERISTICS OF AM/FM

- scale:
 - service maps are needed at a scale of 1" to 100'
 - general systems planning may require scales down to 1:1,000,000, e.g. for electrical utilities
- data sources:
 - data generally collected during construction or maintenance, using sketches on standard basemaps
- data quality:
 - high data quality is desirable, e.g. accurate positioning of underground facilities, but not always attainable in practice
 - much urban infrastructure (e.g. water, sewer pipes) may be more than 100 years old and many historical records may be missing

Functionality

- AM/FM systems stress addition of geographical access to existing databases

- database likely to remain on mainframe
- geographical access may be from workstation with geographical data maintained locally
- non-geographical data characterized by frequent transactions - requires access to database from many workstations
- geographical data input independently using specialized graphics workstation
- backcloth used for input
 - backcloth is a basemap showing the facility locations to be digitized as well as other geographic details, e.g. streets, parcels
 - digitizing may be done on screen with backcloth displayed in raster form using video technology
 - however basemap itself is not entered into database
- some vendors supplying the AM/FM market argue that:
 - AM/FM applications are literally "geographic information systems" - providing geographically based access to information
 - systems which provide analysis and modeling functions are better described as "spatial analysis systems"

Organizations

- AM/FM International - mostly utilities with strong representation by vendors, governments
 - little involvement as yet in education, research
 - branches in many countries

F. EXAMPLE - EASTERN MUNICIPAL WATER DISTRICT

Background

- the Eastern Municipal Water District (EMWD) of Riverside County, California, provides agricultural and domestic water, sewer collection and treatment and water reclamation services to a service area of 534 square miles, population of over 250,000
 - land use in the service area is a mix of very rapidly growing urban and suburban areas as well as rural farm land, mountains and desert
 - has 50,000 domestic water customers supplied with water imported from the Colorado and California Aqueduct Systems as well as from 54 local ground water wells
 - 33,600 sanitary sewer customers served by 5 regional water reclamation plants treating more than 24 million gallons of sewage per day
 - has an annual operating budget of over \$60 million
- area is developing very rapidly
 - population in the service area is anticipated to reach between 600,000 to 1 million by the year 2010
 - number of customers is expected to triple in that time
 - number of company employees will increase from 340 to 800

this extremely rapid growth has made it very difficult for the company to keep up-to-date on service maps and to plan properly for the installation of new services

System development

- initially the interest in automation was simply a recognition of the immediate need for automated mapping as a way to deal with the backlog of mapping and record updates
- however, during the process of system planning, several other potential information and engineering applications were also identified
- therefore, the purpose of the AM/FM is:
 - on the short-term, to map and manage facilities in the high growth environment
 - on the long-term, to incorporate planning and sewer and water engineering analysis into the system

System configuration

- with the assistance of a consultant the EMWD developed a plan for implementation of a major AM/FM system based on Intergraph equipment and software
- overhead - EMWD proposed AM/FM system configuration

Map products

- map products were the initial purpose of the system and their production is critical to the immediate success of the system
- overhead - EMWD Map products
- lists the maps which will be produced once the database is complete

Applications development

- the current Facilities Master Plans identifies and recommends computer programs for engineering analysis in the long range planning of new facility construction and operating procedures
 - therefore, the system is designed to allow storage and interactive access to information for flow analysis of sewer and water models, using existing engineering analysis programs
 - during the development of the AM/FM database, designers needed to identify and incorporate additional attributes that would be used in these models
- for long-range planning of facilities the system is designed to:
 - provide spatial analysis capabilities to allow projection of future resource requirements based on demographic and economic data
 - provide tools for the generation of construction work orders and detailed mechanical and electrical design drawings

system designers also ensured that the final system will support the inclusion of topographic data which can be used in several anticipated applications, including

- hydraulic network analysis
 - groundwater modeling
 - identifying locations for radio telemetry facilities that will be used to provide real time data on flow and water levels
- customized report generation will assist the maps and records department provide inventory and facility asset information for the County Tax Assessor
 - records will be generated by facility type, geographic area or any combination of attributes requested
 - digital tax rolls from the Assessor's office can be quickly checked against the property owner data maintained by EMWD
 - customer service department will use the system to provide integrated access to meter reading, customer billing, facility locating and other inquiry processes

REFERENCES

Many examples of AM/FM installations are described in publications from AM/FM International including the annual conference proceedings and their trade journal, The Scribe.

Wagner, M.W., 1989. "The Eastern Municipal Water District AM/FM/GIS project," Proceedings, Conference XII, AM/FM International, New Orleans, April 1989, pp. 526-541. Describes in detail the planning and implementation plan for the EMWD system reviewed in this unit.

EXAM AND DISCUSSION QUESTIONS

1. Compare and contrast the application fields of AM/FM and resource management, and the systems which have been developed to service them.
2. Why would a raster-based system like IDRISI not be useful for AM/FM applications?
3. Examine recent issues of an URISA publication, such as the annual meeting proceedings, and describe the range of issues covered. What evidence is there for an increasing convergence with AM/FM? with resource management applications of GIS?

Last Updated: August 30, 1997.