UNIT 60 - SYSTEM PLANNING OVERVIEW

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Compiled with assistance from Frank Gossette, California State University, Long Beach, Warren Ferguson, Ferguson Cartotech, San Antonio and Ken Dueker, Portland State University

The introduction to this unit describes the outline for the next module.

Many of the issues outlined in this unit are illustrated in a 20 minute video, GEOBASE - A Better Way, produced by and available from the City of Newport Beach, California. The video was originally intended for viewing by the City Council and other city officials to show the progress and promise of the GEOBASE system.

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A. INTRODUCTION

- in most cases, the design, purchase and implementation of a GIS is a significant commitment in terms of personnel time and money

- it is extremely important to understand the issues involved in the development of GISs
  - these issues will ultimately affect the efficiency and value of the installed GIS

- it is possible to identify several stages in the development of a GIS
  - these can be characterized in several ways
  - the following general outline serves as an organizing framework for the next 6 units:

- development progresses through the following stages
  - note that these are not necessarily sequential and some may operate concurrently with others

1. Problem recognition and technological awareness
   - a necessary beginning point

2. Developing management support
   - critical to the initiation and success of the project

3. Project definition
   - includes identifying the current role of spatial information in the organization, the potential for GIS, determining needs and products, writing the proposal

4. System evaluation
   - includes reviewing hardware and software options, conducting benchmark tests, pilot studies and cost benefit analysis

5. System implementation
   - includes completion of a strategic plan, system development and startup, design and creation of the database, securing on-going financial and political support

- this unit looks at the two least formal and unstructured initial stages: needs awareness and building management support

B. PROBLEM RECOGNITION/TECHNOLOGICAL AWARENESS

- in order for an organization to become interested in acquiring a GIS, someone or some group within the organization: 1. must perceive that the methods by which they are currently storing, retrieving and using information are creating problems 2. must be

aware of the capabilities of GIS technology

Problem recognition

- Aronoff (1989) suggests six problems that prompt GIS interest

1. spatial information is out of date or of poor quality
    - e.g. often land information documents (maps and lists) are seriously outdated and questions regarding the current situation cannot be answered without digging through a stack of "updates" since the last major revisions

2. spatial data is not stored in standard formats
    - e.g. a city's parcel maps will often vary in quality from one area to another
        - one area may have been "flown" and mapped using aerial photography at 1:1000 scale some years ago, but updated by hand drafting
        - other areas may have been mapped by photographically enlarging 1:24,000 topographic maps, or city street maps of unknown quality, and hand drafting parcel boundaries
        - maps may have been reproduced by methods which introduce significant errors, e.g. photocopy

3. several departments collect and manage similar spatial data
    - this may result in different forms of representation, redundancies and related inefficiencies in the collection and management of the data

4. data is not shared due to confidentiality and legal concerns

5. analysis and output capabilities are inadequate

6. new demands are made on the organization that cannot be met within the data and technological systems currently available.

Technological awareness

- sometimes the "problem" is simply an awareness of newer technologies that offer a "better way"

- King and Kraemer (1985, p.5) distinguish between supply- push and demand-pull factors in leading to awareness and the eventual acquisition of computing technology

Supply-push factors

- changes in technological infrastructure
    - improvements in technological capability
        - in GIS: improved hardware, software, peripherals; better access to existing digital datasets, e.g. TIGER files
    - declining price-performance ratios
        - in GIS: impact of introduction of 286- and 386-based PCs, workstations,

reduction in cost of mainframes and minis
    - improved packaging of technical components to perform useful tasks
        - in GIS: better (more friendly, more versatile) user interfaces, better applications software

- concerted marketing efforts of suppliers
    - advertising creates an aura of necessity
        - in GIS: hard not to go with the current trend, in spite of the fact that GIS advertising is probably low-key relative to other areas of EDP
    - direct contact of salespeople with potential buyers
        - in GIS: demonstrations at trade shows, presentations at conferences by vendors

- long-term strategies of technology suppliers
    - selective phase-outs - vendor drops support of existing system to encourage new investment
    - price reductions or outright donations to universities to raise students' familiarity with product
    - low-cost or cost-free pilot studies offered by vendors at potential customer's site
    - interchange - at present, there are high costs to conversion from one GIS vendor's system to another's - customers are "locked in"

Demand-pull factors

- endemic demand for accomplishing routine tasks

    - need for faster and more accurate data handling in report generation, queries, map production, analysis
    - society's appetite for information is unlimited
    - in GIS, there is no upper limit to need for spatial data for decision-making
        - there is no totally satisfactory minimum level of accuracy for data
        - more accurate data always means better decisions

- institutionalized demand
    - "keeping current" with technology
    - maintaining systems on which the organization has become dependent

- affective demand
    - perceived need among organizational actors to exploit the political, entertainment and other potentials of the technology
    - in GIS: GIS technology is impressive in itself - high quality, color map output, 3D displays, scene generation - GIS output may be perceived to have greater credibility than hand-drawn products

Collecting information on GIS

- once the need for GIS is recognized, an individual or group may begin gathering information on GIS in order to develop a management proposal

- information will need to be collected on:
  - the status of existing GIS projects
  - the direction the GIS industry is moving
  - the potential applications of GIS in the organization

- sources of information include:
  - personnel within the company
    - "missionaries" or GIS proponents may have familiarity through educational background, external contacts
  - industry consultants, system vendors, conversion service companies will be very willing to provide information
  - industry organizations such as AM/FM International or American Congress on Surveying and Mapping (ACSM) are excellent sources
  - a growing number of newsletters and magazines are being marketed within the GIS industry

- a useful mechanism is a Request for Information (RFI)
  - sent by the company to all known vendors of GIS software
  - should ask for:
    - general company information
    - system capabilities
    - hardware and software requirements
    - customer references
    - general functional capabilities
    - example applications
    - customer support - training and maintenance programs
    - general pricing information

- site visits to operating GIS projects are useful
  - can observe the daily operations of the project
  - gain insight from project personnel about system performance and support

Project plan

- after consulting with industry experts, visiting other sites, considering corporate objectives, the first level of project definition and planning can occur
  - project plan should be dynamic, adaptable, refined as better information becomes available
  - plans will be very general, broad-brush at this stage - a general description of the desire to investigate systems further and a plan for proceeding

- for those charged with developing a project plan, it is important to discover who or what is the force behind the interest in GIS
  - the individuals involved and the significance of the problem are important in determining how to proceed with selling the idea to the organization

C. DEVELOPING MANAGEMENT SUPPORT

- once the need has been identified it is critical to gain support of the decision-makers who will be required to commit support in the way of funding and staff

- decision-makers need to be assured that the project will be developed and managed in a sound manner

- management will need to know: 1. what GIS is and what it can do for the organization 2. what the costs and benefits of the system will be

- a carefully managed development project is critical

Example - AM/FM Project Life Cycle

- AM/FM projects tend to be very large (up to $100 million is not unusual)
    - thus, the process of system planning and implementation must be rigorous in AM/FM because of the size of investment involved

- in the AM/FM area, this planning process is called the project life cycle

  overhead - AM/FM Project life cycle

- is a multi-step approach with well-defined decision points
    - series of stages provides a generic, structured approach to planning
    - this recommended sequence has been devised after reviewing numerous alternative methodologies

- decision points provide for financial analysis
    - each decision point allows the project team to analyze progress and future risks before proceeding to the next level of commitment
    - need to minimize risks while maximizing benefits

Administration of the project

- with initial support assured, the project requires strong leadership to implement the system

- quite often, the agency realizes that their own people do not possess the expertise nor have the time to fully explore and evaluate the alternatives
    - in this case, an outside consultant may be brought in to assist in a "needs assessment"
    - the GIS consulting industry is growing rapidly, and now involves several of the "big 8" major international management consultancies

D. NEWPORT BEACH GIS PROJECT

- Newport Beach, California developed one of the early successful urban GISs
    - the following section reviews the initiation and development of their GEOBASE project
    - this provides a general introduction to the process of GIS system development

Needs awareness

- interest in Geographic Information Systems for multi- purpose cadastral applications arose at about the same time in several major departments of the city
  - data processing professionals were exposed to the technology at trade shows
  - the Utility Department saw innovations in AM/FM at the major utility companies and some larger municipalities
  - city planners were exposed to GIS by attending professional meetings

- these and other departments were becoming aware of these newer technologies being successfully implemented in other cities

- with a core of interested individuals, an informal committee was formed to study GIS and see what it could do for them

Management support

- to gain administrative support for a LIS, the GEOBASE Committee set about educating the major departments within the city about the benefits of GIS and recruiting their support
  - this included Data Processing (Finance), Utilities, Planning, Building and Safety, Public Works (Engineering), Fire, Police, and even the Library
  - a series of units and demonstrations were set up to inform departmental personnel of the proposed project

- the result of these efforts was a proposal to the City Council and City Manager for funding for an integrated Land Information System
  - this proposal had the endorsement of all the departments mentioned above
  - the GEOBASE project was approved

Administration of the project

- in Newport Beach, a GEOBASE Steering Committee, comprised of representatives from five departments (Utilities, Planning, Data Processing, Building, and Fire) was established to guide the project's implementation phases

Establishing the automation priorities

- in Newport Beach, it was recognized that while potential benefits to all departments of the city might be realized, difficult decisions needed to be made

  concerning the priorities of data entry and application building

  - land parcel information was the highest priority, with other infrastructure elements (street centerlines, right-of-way, and utility lines) to be entered in the initial conversion effort

- importantly, because the City wished to have complete control over the accuracy of the data, it was decided to do the map conversion and data entry in-house

Pilot projects

- in the GEOBASE project, two major pilot projects were undertaken during the first year of operation
- one took a portion of the city and converted the parcel and infrastructure data as a "Prototype" for the eventual city-wide basemap
  - this project was useful to determine the best ways of entering the cadastral information (scanning versus digitizing versus coordinate geometry) and for establishing the ground control and accuracy standards for the database
- the second project involved digitizing the entire city, block-by-block, from a smaller-scale basemap to be used to revise the City's General Plan
  - in this project, valuable skills were gained in map production, establishing symbolization standards for City maps, and dealing with attribute databases
  - both projects produced useful and highly "visible" results

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EXAM AND DISCUSSION QUESTIONS

1. There are over 3000 counties in the US, each with their own needs for LIS and multipurpose cadaster. What factors would you expect to influence the priorities and plans of each county in this area? Design a questionnaire survey that could be used to verify your answer.

2. Compare the circumstances in Newport Beach to those in your local area. Are they similar? How does the state of LIS development in your area differ?

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UNIT 60 IMAGES