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UNIT 61 - FUNCTIONAL REQUIREMENTS STUDY

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

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Obtain an FRS from a local government operation to use as an illustration for this unit. Unfortunately, there are no readily available references to support this unit.

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A. INTRODUCTION

- once management support has been obtained, the next step is a functional evaluation of the current manual process
 - existing functionality and any new requirements, will be used to define the project scope and basic structure of the implemented GIS
- the result of this phase is the Functional Requirements Study (FRS)
- the functional requirements study (FRS) is the primary planning document for a GIS installation
 - it lays out what data is needed, how it must be processed in order to make the necessary reports and products
 - it forms the basis for a Request for Proposals (RFP)
 - during installation and system startup, it provides the basic reference guide
- very structured methodologies for functional requirements studies have been developed by consulting companies
 - these proprietary methods provide the basis for some of the competition in the lucrative GIS consulting market
 - this unit will therefore take a broader viewpoint, not focusing on the mechanics of any one methodology

B. DEVELOPING AN FRS

- are best created by working in the opposite direction to the GIS's processing

1. Identify decisions

- begin by identifying the decisions which people in the organization are required to make
 - what is each person's area of management responsibility?
 - what decisions must be made in carrying out that responsibility?

2. Determine information products needed

- identify the information products needed to support those decisions
 - e.g. to schedule service crews, need a map showing locations of service calls
- at this point consideration of new methods and products is appropriate
 - what additional products would be important in supporting each user's decision-making responsibilities?
 - how might existing products be modified/improved to support decision-making better?

- this process involves users in the project definition process
 - opens communication channels
 - helps increase support for the project
 - allows potential problems to be identified and dealt with prior to commitment to the project
- users may not be familiar with GIS technology and its capabilities
 - need to stress the irrelevance of technology at this stage - simply assume that the necessary technological capabilities exist, and concentrate on determining the user's needs for its reports and products

3. Determine frequencies

- each information product will have an associated frequency
 - e.g. the service call map must to produced every morning at 8 am

4. Identify data sets required

- identify the data sets which must be processed to create the required product
 - e.g. the service calls come into my office as completed forms giving street addresses and details of the nature of the service request

5. Determine GIS operations required

- identify the processes or operations which must be performed on the data to create the products
 - this step is most likely to require some knowledge of GIS operations
 - however, it is possible to refer to operations in a generic way, or by analogy to manual operations, without knowledge of GIS technology

Scope of the FRS within the organization

- a full FRS gives an organization a significant opportunity to examine its own operations
- the investigators should clearly identify the appropriate level at which to interact with each department of the organization
 - interacting personnel need to be decision-makers and managers, not technical support since the study should focus on the decisions that are made, not on the data and procedures used
- an effective FRS requires a large commitment of time
 - the organization as a whole must be willing to commit the necessary amount of time on the part of its staff
 - less than full commitment (interruptions, absence from meetings) will destroy the purpose of the FRS

C. METHODS FOR CONDUCTING AN FRS

- many alternative methods can be used to elicit the necessary information for the FRS
- methods can be ordered by the level of commitment of the organization's time and the associated cost of the FRS
 - the following begins with the most costly and works through to the least
- choice made will depend on the amount of time/money the organization is willing to commit to the FRS
- this depends in turn on the size of the eventual project
 - e.g. a \$2 million project may justify a \$100,000 FRS, i.e. a 5% investment in good planning

1. Fully internalized

Procedure:

- organization appoints an FRS team from its own staff
 - FRS team trained by GIS consultant
- FRS team coordinates the definition of information products by organization's staff, act as facilitators
- FRS team compiles information and identifies input data sets, functions required to make products under guidance of consultant
- consultant prepares final FRS

Advantages:

- FRS team combine familiarity of organization's operations with limited knowledge about GIS and FRS procedure acquired from consultant

Disadvantages:

- cost of high level of organizational commitment

2. Focus group

Procedure:

- consultant acts as leader at a series of group meetings of organization's staff
 - meetings are used to discuss procedures, prepare and edit descriptions of products and define input datasets and system functions

Advantages:

- focus group allows consultant to facilitate but leaves work mostly to organization's personnel

- excellent tool for building consensus on what is needed

Disadvantages:

- by isolating FRS-related activity to focus group meetings, level of commitment of organization's staff is lower

3. Interviews

Procedure:

- consultant gathers information at interviews, prepares FRS

Advantages:

- minimal commitment of organization's personnel

Disadvantages:

- organization has little or no group involvement in FRS

4. Questionnaire

Procedure:

- consultant prepares a questionnaire with advice from the organization, circulates it to all appropriate staff

Advantages:

- low cost, appropriate for obtaining limited information from a large number of users

Disadvantages:

- poor quality of information gathered, no opportunity for discussion

D. COMPONENTS OF THE COMPLETED FRS

handout - Functional requirements study example (4 pages)

1. Definitions of information products

- see Unit 68 for handouts of products identified in an FRS
- products may be maps, reports, lists
- for each product need:
 - frequencies of production
 - details of input data
 - processing steps required to make the product

- for maps, need associated scales, legends, symbolization details
- for lists and reports, need details of formats
- useful to prepare rough samples of each product
- a large organization may generate descriptions of tens or hundreds of different products

2. List of input data sets

- need details of data to estimate input workload
 - volume, e.g. how many map sheets, how many records, how many attributes?
 - format, e.g. paper maps, digital tape, survey documents
 - sources
 - frequency of update
- data sets may be shared between products
 - e.g. basic street map may be part of many different information products
- important to know product priorities
 - products cannot be generated until data is input, and input may take a long time
 - some products may be input data for other products, which creates problems in scheduling

3. List of GIS functions required

- some functions may be needed only for one or two products
- others (e.g. plotting) may be needed for all
- also need to include functions for data input, e.g. digitizing
- list of functions must make sense to staff with no GIS knowledge

E. WEAKNESSES OF THE FRS PROCESS

Invalid assumptions

- the assumptions of the method may be invalid
 - it may be impossible to separate issues of technology from requirements, e.g. raster vs. vector
 - it may be impossible to anticipate the information needed to make decisions
 - it may be difficult to anticipate the decisions that will need to be made if the roles of personnel in the organization are not adequately defined or vary too frequently
- can decision-making be reduced to the simple model of analysis of information products?
 - will the products really be adequate and reliable enough?

Awareness of GIS

- varying awareness of GIS in the organization may bias the results
- staff will define products based on their personal awareness of GIS, not on an abstract need for information
 - e.g. staff may be aware of GIS use in a parallel organization, familiar with some of its products
 - e.g. awareness of 3D perspective views may lead to requests for them, independently of actual value in decision-making process

Funding uncertainty

- FRS assumes continued funding over the projection period
 - can the organization sustain funding over a long implementation period
- many organizations find it difficult to commit funds up to 5 years ahead

Changing needs

- will the FRS be sufficiently valid at the end of the implementation period?
 - have to expect changes in the product set long before the system is in full operation
 - need mechanisms for review and update

Value of GIS

- has GIS technology been oversold?
 - will the production schedule be delayed by data input bottlenecks?
 - will the costs of the system overrun estimates?
 - will the technology be obsolete by the time the project is implemented and in full production (up to 5 years may be needed for full database implementation)

E. IMPORTANCE OF THE FRS

- despite all the uncertainty, planning, however unreliable, is undoubtedly better than no planning
 - the exercise of a functional requirements study is beneficial to the organization in focusing discussion of its procedures irrespective of the eventual outcome
- management can conduct an initial financial feasibility study
 - the costs of the existing operation are projected assuming the GIS project is not implemented
 - these are weighed against the estimated costs of implementing the project, including costs of:
 - pilot study (if required)
 - system acquisition
 - system development
 - data conversion
 - duplicate operation during system startup retraining

EXAM AND DISCUSSION QUESTIONS

1. Discuss the methods you would adopt to carry out functional requirements studies for:
 - a) a National Forest with a staff of 200 and responsibilities ranging from timber sales to management of historical heritage
 - b) a small consulting firm with a staff of 5 specializing in site selection studies for retailers
 - c) a One-Call operation answering 200 telephone queries per day about the locations of underground utility facilities likely to interfere with construction projects
2. List and review the assumptions made by the FRS process discussed in this unit
3. In what ways is the GIS FRS process different from any other FRS process in information processing? Do the differences justify a separate approach?
4. Define the input data, products and processing needed for your campus student records system.
5. RFPs and functional requirements studies are often public documents, especially when public agencies are involved. Obtain one from an agency in your area, and discuss its contents using the framework described in this unit.

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