UTILITY LINES AND FACILITY MANAGEMENT – A TASK FOR THE SURVEYING ENGINEER

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ABSTRACT

This paper deals with the specific tasks common to linear objects and facility management systems relevant for surveying engineers.

The need for documenting their data using modern geographic information systems (GIS) technologies is accepted without question for energy providers, communication providers, and for traffic systems of roads and rails. All gas, electricity and water suppliers are required to document the geometrical position of the utility lines constituting their respective networks. In areas of application where geometric information of large scale has to be maintained, the data for documenting the as built situation have a proportion of 80% of the whole GIS investment, and these data normally survive several hard- and software generations.

Facility management can be seen as a consequent extension of the methods of managing company resources for utility lines into the building sector. Therefore the basic tasks are similar, especially proper spatial data acquisition for buildings and the interface to computer aided facility management systems are required.

Computer Aided Facility Management Systems (CAFMS) map and manage all cost relevant processes of landed property and buildings. In order to find a suitable mapping, the processes have to be analyzed. Two main classes of information result. There is the class of object information dealing with object specific properties, and the geometry related information. In general the geometry related information forms the skeleton where all information, related to the property of objects, can be referenced to.

Analyzing the effort necessary to generate and maintain a CAFMS, it becomes obvious that the part of data acquisition and consistent update of geometrical information causes immense cost. Therefore every user of a CAFMS has a fundamental interest in minimizing this high economic effort, taking into account the boundary condition that the necessary quality will just be maintained.

The surveying engineer has shown best skills in finding the way to the basic parameters for an economic acquisition of geometrical data with acceptable information quality. In two areas of activity, where the experience in proper handling geometrical data is essential, the surveying engineer can contribute to the solution. These are the design of suitable data models for the task described before, and the data acquisition task for geometrical data, where not only the actual

measurements are considered, but the automated processing of geometrical information of all types. Both areas will be illustrated in a more detailed way.

Tasks common to linear objects and facility management cover the following topics:

- The description of the specific properties.
- The data modelling and data presentation
- The problem of a unique spatial reference frame
- The techniques for data acquisition of geometrical and descriptive data
- The data maintenance and data exchange
- The usage of data and the perspectives of use

Special emphasis has to be given to the management and usage.

Common to facility management and linear objects is the modelling of geometry objects in a unique spatial reference frame which is independent of geometrical changes of any reference object. It is essential to shift intelligence from the data acquisition tools to the processing part, exploiting redundancy of measurements and applying powerful adjustment techniques in data processing. In addition, different levels of generalisation have to be realised in the data model for geometrical objects which should be based on a common data pool.

The high demand both for personal mobility and for the ability to transport goods of all kinds over long distances is characteristic for our time. It is necessary to dynamically balance traffic flow, to select the optimal routes for transport to provide drivers with a set of information services like optimal routes, traffic jams, road obstacles and to increase the efficiency of our transport system by integrating it in the best possible way.

A key to all these problems is the information based on the geometry and topology of linear objects. The goal is approached by evaluating and documenting the typical representatives of linear objects with respect to the above mentioned characteristics. A key role for linear object type problems is the provision of standardised representations of traffic networks and of service and energy supply networks. When digital road- and rail maps will be available in a unique information structure intermodal traffic- and transport-management will become feasible.

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