3D Registration of Real Estate Objects

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The Land Administration Office is mandatory to register the legal status and legal transactions of real estates and parcels. In order to increase the efficiency and to make network access possible to the data involved, these parcels and real estates are stored and managed in a land information system (Dale and McLaren, 1999). Until now the juridical borders defining a parcel are fixed in 2D space: the geometry and topology of parcels are maintained in a 'flat' 2D spatial information system (Lemmen et al., 1998). This means that the vertical dimension, which may be important, can only be registered administratively and can therefor not be registered adequately in many cases.

Nowadays situations occur in which the third dimension is an important factor in registering real estate objects and parcels. Examples are:
- subterranean constructions
- subterranean infrastructure (see figure 1)
- constructions upon each other (see figure 2)
- apartments
- the ownership and the location of cables and pipes
- polluted areas
- resource permits (geology)

These situations are difficult to register and to represent with the existing 2D databases.
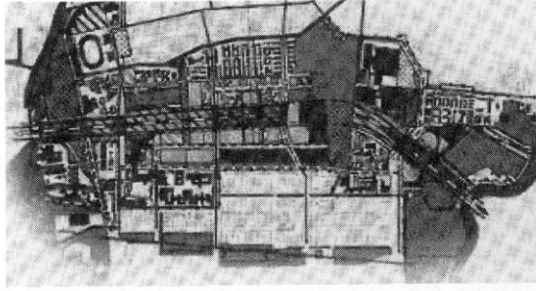
Figure 1: subterranean infrastructure and constructions like subways demand a further going juridical partitioning of space than a 2D partitioning
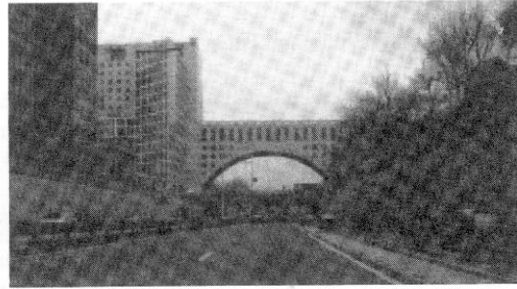
Figure 2: a situation in which defining right of property in a 2D database is complex: a road, bridge and a building on top of each other, all with different owners

To be able to define and manage the juridical situation satisfactory 3D information becomes indispensable in registering nowadays world. A system that can manage information about topology and geometry in the vertical dimension is therefor needed. Consequently, such a system will make adjustment of the current flat legislation possible.

At the Delft University of Technology, Department of Geodesy, a research is done in collaboration with the Dutch Cadastre and Public Registers Agency to study the 3D issue of land registration in The Netherlands in a fundamental way. The research aims to develop a land information system, which can take the juridical relevant spatial information in the vertical dimension into account. The study contains a research in the following areas:

- the juridical issues of the 3D topic (for which occurring situations is a 2D system not adequate, which vertical information is needed in those situations)
- 3D databases and 3D data processing
- developing (standards for) 3D data models and data structures (geometry, topology, attributes, history)
- linking 3D data models and 2D data models
- managing the quality
- editing in 3D ('CAD')
- 3D visualising

Integration of (3D) CAD en GIS

Nowadays a lot of research is done on the subject of linking 3D GIS en 3D CAD (Rimscha, 1997). The research to develop a 3D registration system for the Dutch Cadastre and Public Registers Agency will join the findings in this research area.

OpenGIS solutions

In OpenGIS developments, research is done on 3D data structures and 3D data models (OGC, 1996). The membership of our university of the OpenGIS Consortium makes it possible to use the findings of OpenGIS developments and to support a further development of standards in this area. In the OpenGIS Consortium, a special interest group (SIG) on this subject is erected.

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