

On the Nature and Relationships of 3D Spatial Cadastral Objects

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SUMMARY

After the incorporation of digital Information Technologies (IT) in the regular operations of mainstream cadastral systems, particularly in the advanced countries, attention has been paid in expanding the capabilities of those systems in other areas of operations and capturing additional aspects of the cadastral domain. An important path of work that has been initiated, particularly at the research level, since the beginning of this century deals with the incorporation of the 3rd spatial dimension of cadastral objects (that is, the vertical dimension) into the IT cadastral systems. Most efforts, so far, have focused primarily on capturing and representing the physical and technical aspects of real 3D entities (e.g. buildings, structures etc.) However, in order for those systems to really incorporate the essence of the spatial dimension of the cadastral objects and use it in covering the everyday cadastral activities, it is important to analyze the real nature of physical and abstract objects involved in the process and determine the various relationships that exist among them in the cadastral context. This paper focusses on these two subjects and presents some fundamental properties that characterize various types of real and abstract 3D spatial cadastral objects. Also, it presents a set of fundamental spatial relationships that are defined among them and discusses their properties. Finally, it presents certain issues that are raised in the management, use, and displaying of such 3D spatial objects and relationships in an operational setting. All these concepts are highlighted using examples drawn primarily from the Greek context, although similar examples may be found in other socio-political settings, as well. This kind of work contributes particularly in the identification, definition, and clarification of the core 3D spatial objects and relationships that characterize typical cadastral domains and in the abstraction and conceptualization of those objects and relationships in a form that is amenable to further computer representation and processing. This abstraction and conceptualization is necessary for building operational and useful information systems that can handle representations of 3D spatial entities and relationships in the cadastral domain.

BIOGRAPHICAL NOTES

Panos Lolonis is a member of the Scientific Council of the Hellenic National Cadastre and Mapping Agency (NCMA). He has a diploma in Rural and Surveying Engineering from the National Technical University of Athens, Greece (1986), a Master of Arts and a PhD in Geography from the University of Iowa, U.S.A. (1990 and 1994, respectively). Dr. Lolonis specializes in cadastre, Geographic Information Systems (GIS), cartography, and spatial analysis. He has authored (or coauthored) more than 30 research articles in international journals and conference proceedings. For his academic performance and work, Dr. Lolonis has received several awards by Greek and international organizations. For the past twenty (20) years at the Hellenic NCMA, Dr. Lolonis has held the posts of Scientific Consultant, Manager of the Planning, Research, and Development Division, Coordinator of the Planning and Quality Department, Head of the Project Planning Office, and Director of the Planning Department.

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