

A. Summary

This thesis summarizes the scientific and research activity supported by the candidate after the public presentation of the Doctoral Thesis sustained at the Technical University of Civil Engineering Bucharest and confirmed by Order of the Minister of Education and Research no. 3896 of 24.04.2003. The research activity of the candidate as well as his achievements can be synthesized in three distinct themes, developed in the present paper, which touch on the following aspects:

- 1) Spatial data acquisition with terrestrial multisensors;
- 2) Optimization of spatial data processing;
- 3) Geodetic aspects regarding the elaboration of hazard and risk maps

The first research direction relates to: **Spatial data acquisition with terrestrial multisensors**. This activity is carried out in the research field conducted during doctoral studies through new subjects or in fields closely related to it.

My academic activity began in September 1996, teaching "Surveying", "Cadastré", and my first taught course was "Automation of Cadastre Works". The PhD thesis, which was supported in 2003, was completed with the development of a technology for the automatic acquisition of the graphical image of the numerical cadastral plans by using a characteristic code system in the field data collection with the help of the total stations. This technology has also been applied in the conduct of research contracts carried out between 1999-2003 regarding the introduction of the real estate cadastre in Arad city and the establishment of the urban data bank for Arad city.

The emergence of terrestrial laser scanning technology has produced a major shift in the spatial data acquisition mode. Knowing the geometry of the object is of great importance, both in the documentation of existing constructions and installations, as well as in the restoration of historical monuments. With terrestrial laser scanning, the geometry of an object, without reflector, can be determined with high accuracy and high speed. I have continued to write scientific papers in this specific, growing field, both in volumes of scientific events indexed in the Web of Knowledge (ISI) and other relevant international databases (BDIs).

Another direction of research is **Optimization of spatial data processing**. This direction continues the theme of the PhD thesis, being consistent with the researches in the field and focused on both the optimization of the textual databases and the graphical databases specific to the cadastre. Regarding the techniques for query optimization on a cadastral textual database, SQL language was used. Older database management systems used queries (also called virtual charts) for the following two purposes: first as a protection mechanism to restrict access to certain datasets from one or more tables, and secondly as a mean of customizing the view of the data in the tables, depending on the user's informational needs. Improving the performance of textual databases by optimizing queries always results in decreasing response time and improving system performance.

In terms of querying a cadastral graphical database, the Visual LISP programming environment has solved specific problems. Visual LISP allows the customization of specific operations in the CAD environment, such as the processing and automation of cadastral work. The articles written in this direction were aimed at creating routines that allow the manipulation of cadastral

graphical databases, enabling the improving of work productivity in office work specific to terrestrial measurements.

The third research direction refers to **Geodetic aspects regarding the elaboration of hazard and risk maps**. The main objective of a hazard map is to provide residents clear information about exposure to risk generated by different processes and phenomena in a limited area, regardless of the process that generates it. The risk map presents the possible human and material damage in the area.

Technologically advanced countries have ensured minimum acceptable conditions of risk based on strategies to monitor the phenomena that affect the survival conditions of population and environmental protection, where a very important role is played by cartographic representation, more precisely, mapping based on the calculation of risk indices and integrating a very large volume of information included in geographic information systems (GIS).

The geodetic aspects regarding the elaboration of hazard and risk maps were a personal concern, as well as within the team formed at the level of the Faculty of Geodesy, in carrying out research projects on the implementation of Risk and Hazard Maps for the hydrographic basins Prut - Bârlad and Dobrogea.

The research activity in this direction is multidisciplinary, the contact with specialists from different fields of research through the participation as a member of the Specialized Technical Committee CTS-14, Hazards and Natural Risks, MDRAP Decision no. 60371 / 25.07.2013, having a major impact on the development of my research in this direction.

Priorities in recent years have been linked both to the publication of books and to participation in numerous scientific conferences and symposiums, which has given me the opportunity to have direct feedback on my research work.

My ISI indexed works can be found at <http://www.researcherid.com/rid/P-4272-2017> and the main articles (BDI, ISI and other papers) as well as citations can be found at <https://scholar.google.com/citations?user=dX0Cgg0AAAAJ&hl=ro> having in Google Scholar h-index = 5.

Future research directions could be related to geospatial databases, measuring and control devices for building monitoring, terrestrial laser scanning applications as support for urban planning and spatial analysis in hazard and risk management at national level.

I am a delegate member of the Faculty of Geodesy, UTCB, within the Commission 4 FIG - **Hydrography**, Commission 5 FIG - **Positioning and Measurement** and Commission 8 FIG - **Spatial Planning and Development**.