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Inventory of the accident scene consists of accurate documentation of the post-accident situation, which arose due to a road collision, accident or disaster. All over the world, traffic officers use traditional dimensioning and geodetic or photogrammetric surveying.

The primary purpose of the PhD thesis is to present a proposal for the modernization of the inventory methodology conducted by the police services at the places of the incident. The basic assumption of the developed concept is to enable the automatic generation of a basic road accident plan and the creation of additional reports and lists regarding the accuracy of the data used.

Currently, the source of data on the traces of the road accident and the place of the road accident is a direct measurement in the field. The developed methodology assumes that data about land topography, road, railway and hydrographic infrastructure, as well as building structures, should come from reference databases, which are stored in the national geodetic and cartographic resource. In turn, data on the organization of road traffic, road records and road engineering structures should come from the registers of road managers (Directorate of National Roads and Motorways, Provincial Roads Authority, municipal offices and municipal road authorities). Unlike the previous procedures, the presented concept assumes the need to obtain in the field only information about the traces of a road accident and objects that will be revealed as inconsistencies of the available materials with the actual state. The research problem, with such assumptions, was to develop ways of integrating existing data with data measured at the scene of a road accident using traditional dimensioning with an odometer, total station, video total station, GNSS receiver, unmanned aerial vehicle (UAV), terrestrial laser scanner (TLS) or even a smartphone equipped with LIDAR technology.

The presented PhD thesis was elaborated in cooperation with the Road Events Service Section of the Road Traffic Department of the Warsaw Police Headquarters, which allowed participation in inventories of many road accidents, and with the City Guard of the Capital City of Warsaw, as part of which a measurement experiment was carried out. Materials for the research were obtained from the Municipal Roads Authority in Warsaw and the Geodetic and Cartographic Documentation Centre in Warsaw.

The preliminary model of the post-accident documentation at the site of a road accident includes procedures for proceeding with the field and office work. To assess it, each measurement technology was subjected to a detailed analysis, based on which practical conclusions were formulated regarding the use of algorithms for combined intersection, Helmert and affine transformations, and non-linear transformations for the orientation of the acquired data relative to the secondary system. According to the theoretical considerations and

conclusions from the development of the material obtained during the measurement experiment, a comprehensive inventory methodology based on multi-source data was developed. It primarily contains diagrams of a quick and easy way to fit data based on a small number of adjustment points. The collected material can be used to develop a concept of creating advanced software to solve problems in planning measurement designs. This concept considers the location of measured objects and their neighbourhood, the principle of minimizing interference in the continuity of use of the measurement site, and the conclusions from the initial accuracy analysis and the analysis of experimental measurements.

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