



“We gave Intetics extremely complicated and difficult data to work with, and they returned an easily-navigable map alongside insightful spatial analysis. We will definitely use their services again.”

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LAND USE AGENCY ACCURATELY DEFINES LOT BOUNDARIES THANKS TO UPDATED CADASTRAL MAP BY INTETICS

OBJECTIVE

Create a topographical plan based on UAV data to help a land use agency update cadastre maps for better land resources administration and management.

CHALLENGE

When working with land resources, the main questions that need to be answered is “where” and “how much” of a resource exists. A cadastre is able to easily provide an answer to such questions. A cadastre is a systematically arranged public register of property data, which is based on a survey of property boundaries. Cadastral maps demand periodic updates and refinement, due to changes of the face of the Earth as a result of human activities and natural processes.

The maps are created by surveying the area in question. The last 30 years have seen a dramatic increase in the development of new survey techniques, from traditional optical instruments to newer

sensor platforms. UAV (Unmanned Aerial Vehicles) technology in particular is growing in popularity for cadastral surveying and mapping. Together with photogrammetric operations, this technology has the potential to be an effective means to capture image data for mapping purposes.

Based on these new advancements, a lands use agency decided to use drone-captured images to update their existing cadastral maps, because it is a cheap, precise and real-time data capture method. The map update was necessary for the agency to accurately define lot boundaries and manage land resources effectively. The agency, however, did not have the geo-expertise to process captured images or build topographical plans based on the derived data. They needed a partner who would be able to analyze the UAV images, organize and process data, and map the results. The task was further complicated by the fact that the data was captured by different types and models of UAVs and cameras, creating a myriad of data formats. The data captured was also frequently in violation of traditional survey techniques, requiring special attention.

NEW TOPOGRAPHIC MAP BECAME THE AGENCY'S MAIN TOOL FOR UNDERSTANDING AND DEFINING PARCEL BOUNDARIES.

SOLUTION

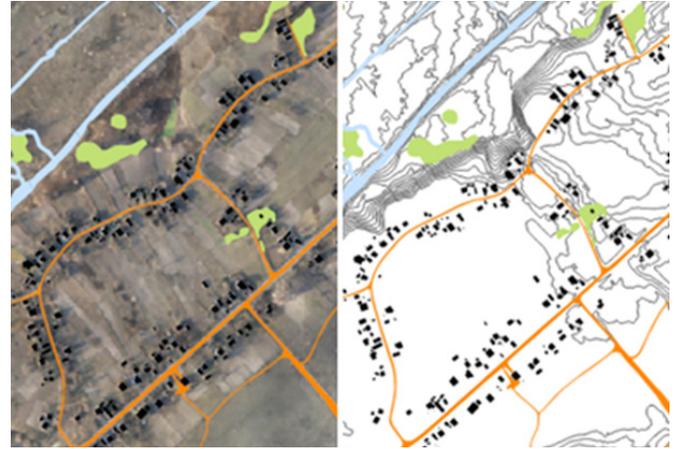
Looking for expertise in GIS technologies, remote sensing and data processing, the lands use agency turned to Intetics. After the completion of fieldwork, Intetics received the data, and began image processing and analysis.

The first step was to calibrate the data to ensure accuracy. The interior orientation parameters of the camera (focal length, position of the principal point, and lens distortion parameters) were estimated through a self-calibration process. Although pre-calibration was not performed in the field, experience shows that self-calibration delivers sufficient accuracy for most applications. To achieve spatial accuracy, common points of photos were detected automatically using professional software, and a point cloud was built using EXIF coordinates and Ground Control Points (GCPs) collected in the field by GPS.

To reach the best results, quality control was performed at each stage of the process. The created point cloud was reviewed and corrected. Intetics also performed auto-classification of ground points with manual control of the classification results. Next, based on the classified point cloud, Intetics generated a Digital Elevation Model (DSM) and an orthomosaic.

Finally, vectorization was performed. This activity took place after the image processing and quality checks were completed. The orthomosaic was used as a base layer for digitizing things such as roads, buildings, and water objects. After that Intetics created the topographical plan based on a relief model and vectorized data.

At the last stage of the project, Intetics



was also asked to perform data analysis of the collected data. The lands use agency wanted to compare buildings previously registered on an existing cadastre with the newly collected data and identify changes. The goal was to find mismatched buildings and note existence of new buildings. The result of the analysis was presented in the form of a map, where significant building changes were highlighted. The map also included a table with numeric data for each altered and newly recorded object.

RESULTS

As a result of working with Intetics the lands use agency was able to use a precise basemap and objective data analysis results in their work process. They received up-to-date, interactive topographical plans, completed using a UAV data collection method that delivered highly accurate results alongside cost efficiency. The new topographical plan became the agency's main source of understanding and defining parcel boundaries.