BIM data as Input to 3D Crowdsourced Cadastral Surveying - Potential and Perspectives

Maria Gkeli, Chryssy Potsiou and Charalabos Ioannidis (Greece)

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SUMMARY

So far traditional procedures have often led to increased costs and long delays in the 2D cadastral surveying procedures, making the completion of first registration difficult or even impossible for many countries. In the meantime, the ongoing urbanization has led to the construction of complex buildings with multi-dimensional property rights even in countries with poor and incomplete 2D land administration systems (LAS). This new urban reality though, requires the establishment of modern 3D LAS to protect and secure property Rights, Restrictions and Responsibilities (RRRs) within the three-dimensional environment. Fortunately, crowdsourcing and VGI have recently claimed a critical role as a reliable methodology with an increased potential for affordable and fast systematic registration of both 2D and 3D cadastral data. It has also become clear that a nation-wide cadastral system may be comprised of various datasets of varying geometric accuracies integrated together in a fit-for-purpose whole. In the meantime, many cities, regardless of the progress in establishing good land administration systems, are mapped in 3D at various levels of detail and have complex buildings designed, constructed and managed by Building Information Modeling (BIM). Linking cadastral information to the 3D digital representations of the man-made environment could be a promising approach in order to define, declare and visualize the complex 3D cadastral space units. The integration of geospatial information derived from existing BIM with the LAS and the use of crowdsourcing methodology to identify the 3D cadastral objects and declare related rights and other necessary information, may significantly speed up the implementation of multi-purpose 3D LAS. Utilizing the Information and Communication Technology (ICT) tools, low-cost equipment, crowdsourcing techniques, web services, open-source software and BIM, the development of a reliable, qualitative and affordable solution for the initial implementation of a 3D cadastre is feasible.

This research focuses on how BIM information and crowdsourcing techniques can be combined

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together to improve the compilation process of a 3D cadastral. The main objective is to investigate and discuss how these domains may interact and cooperate to serve the needs of the systematic 3D Cadastral registration. An innovative 3D crowdsourced cadastral procedure which will also integrate available BIM data is designed, tested and evaluated, aiming to save time and funds and provide a solution for the initial registration and visualization of 3D cadastral data. An open-sourced web application for the visualization and manipulation of BIM data is developed and tested. The user of the application is able to zoom in and out of the scene, make 3D measurements, create vertical and horizontal slices of the building in order to reveal hidden entities, helping him/her to recognize and identify each property unit, and finally insert all the necessary cadastral information, updating the system with new data. The proposed crowdsourced framework is tested on a multistorey building in Athens, Greece. The main potential, perspectives and reliability of such an implementation are assessed and discussed.

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