

# Geodata Enabled Hierarchical Blockchain Architecture for Resolving Boundary Conflicts in Cadastre Surveys and Land Registration

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**Key words:** Cadastre; GIM; Land management; land registry, surveying, boundary, blockchain, GIS, CAD, database

## SUMMARY

In this environment of the digital world, the owners of data are no more centralized, data from multiple sources has to be reconciled for accurate decision making where a new data sharing, de-centralized data approving, quality assurance and data delivery model and mechanism needed. Besides, democratization and decentralization of spatial data among multiple institutes and even individuals compel the Global Cadastre Community to search, find and realize new approaches where ‘data owner is the king’.

In our study, we introduce the problem of inconsistent boundary determination in between succeeding cadastre surveys and a methodology that prevents employment of boundary change into land registry without common and joint approval of all stakeholders. In this paper, after presenting a case study of two physical boundaries which is represented as a unique edge in the cadastre data, in Kirsehir/Turkey, a methodology based on blockchaing technology is proposed to prevent such occasions.

In the proposed geodata enabled blockchain model, there are three components which are loosely coupled, namely ‘blockchain database’, ‘middleware’ and ‘GIS/CAD’. These tree components handle the ‘blockchain component’ handles the communication and trace of transactions, ‘the middleware’ handles a lossless geo and non-geo data transaction and ‘the GIS/CAD’ component handles the geometrical part of cadastre survey. In the blockchain architecture, there are three levels in a hierarchy to control and mutually decide on any transaction by approval of relevant participants in accordance with the land registry and cadastre organization as a trusted node watching the procedures.

Our work mainly contributes, use of blockchain technology to minimize the surveying problems

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caused by incautious considerations and application of cadastral regulations at surveying and data manipulation phases in order to minimize the mistakes that cause unsolvable problems at cadastre surveying phase and has to be handled at cadastre courts.

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