

**UNIVERSITY OF SOUTHERN QUEENSLAND**

**3D CADASTRE IMPLEMENTATION ISSUES IN  
AUSTRALIA**

A Dissertation submitted by

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## ABSTRACT

Increasing pressure on our urban environment has resulted in the development of infrastructure and buildings above and below the surface of the earth. Jurisdictions in Australia and internationally have responded accordingly through the implementation of 3D cadastres. Most jurisdictions have what has been termed a “2D cadastre”, however, “3D cadastre” situations have now created some significant challenges for the existing land administration infrastructure. The Australian implementation of the 3D cadastre is considered one of the best examples amongst other cadastral jurisdictions, however, because of the varying jurisdictional implementation arrangements within Australia, a clear understanding of complex 3D cadastral issues has been difficult to formulate.

The aim of this research is to investigate the institutional and technical issues and characteristics of 3D cadastre developments across Australia and Queensland in particular, to improve the ongoing implementation and developments across jurisdictions. A better understanding of these issues will assist in the identification of areas where future efforts should be focussed. Further, this will assist in highlighting the institutional and technical 3D cadastral implementation issues to be considered by cadastral jurisdictions.

A survey of the eight cadastral jurisdictions of Australia was carried out and the results were analysed to understand the current status of 3D cadastre implementation in Australia. A detailed case study of five cases in the jurisdiction of Queensland was then undertaken to identify specific issues and characteristics of the 3D cadastral implementation. The results were integrated using a mixed methods approach to identify the institutional and technical issues in 3D cadastre and to frame possible strategies to support ongoing implementation of 3D cadastre in Australia.

From the integration of results, eleven issues were identified and grouped into six component classes. The legislative framework of all cadastral jurisdictions was found to be adequate, supportive and encouraging of the implementation of 3D cadastre. Policies, standards and procedures were also found to be supportive but variable. The operational arrangements to support survey plan transactions in

Queensland were also found to be adequate and could be extended to a full 3D cadastral implementation in the future. Queensland registered 3D rights in a similar way to 2D rights; however, it was found that 3D data could not be stored in the existing cadastral database as a 3D object. Specific geometrical representations are yet to be finalised, however, the current practice of creating 3D objects through surface triangles has enabled the representation of 3D objects on paper plans. The development of a 3D specific database and the corresponding validation rules in the future will assist in the full implementation of 3D cadastre in Queensland and other jurisdictions.

This dissertation has provided a comprehensive study of national, as well as a jurisdiction level implementation of 3D cadastre, and has identified a range of institutional and technical issues and characteristics for the improvement of 3D cadastral implementation. It has also assisted in creating a more comprehensive understanding of the issues in 3D cadastre in an Australian jurisdictional context.

## CERTIFICATION OF DISSERTATION

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

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## PUBLICATIONS RELATED TO RESEARCH

- (1) Karki, S, Thompson, R, & McDougall, K. (2009). Data validation in 3D cadastre In Neutens, T. & Maeyer, P. (Eds.), *Developments in 3D Geo-Information Sciences* (Vol. *Lecture Notes in Geoinformation and Cartography*): Springer Berlin Heidelberg.
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- (5) Karki, S, Thompson, R, & McDougall, K. (2013). Development of Validation Rules to Support Digital Lodgement of 3D Cadastral Plans, Computers, Environment and Urban Systems (Under publication Ms. Ref. No.: CEUS-D-12-00048) <http://dx.doi.org/10.1016/j.compenvurbsys.2012.10.007>