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# Guest Editorial

## Land administration domain model and 3D land administration

### 1. Introduction

This special issue on the **Land Administration Domain Model (LADM) and 3D Land Administration (3D LA)** contains the eight best, updated papers from the FIG's (International Federation of Surveyors) 12<sup>th</sup> International Workshop on LADM & 3D LA. The 3DLA2024 Workshop is one of the activities of the LADM & 3D LA Working Group (WG), a joint initiative of FIG Commission 3 (Spatial Information Management) and Commission 7 (Cadastre and Land Management).

The Workshop was held on 24-26 September 2024, in Kuching, Malaysia. The city of Kuching is located in the state of Sarawak, which has its own land-related legislation. The state of Sarawak has an integrated land administration organisation, the Department of Land and Survey Sarawak, responsible for the full spectrum of LA functions, including Land Registry, Planning, Valuation, Title Registration, Survey and Cadastral Mapping, etc. This holistic approach aligns well with the broader ambition of the multi-part LADM edition II.

The Workshop highlighted the growing need for 3D Land Administration Systems (3D LAS) to capture and manage the legal status of increasingly complex infrastructures and densely built environments—something that traditional 2D systems can only provide to a limited extent.

Key research areas addressed in this issue include:

- 3D LAS as part of the full Spatial Development Lifecycle: from survey, planning and design, through permitting, registration, and use all in 3D,
- 3D LAS cost effective workflows for creating and updating 3D parcels,
- Legal aspects for 3D LAS and comparable best legal practices in various legislation systems,
- Integration of BIM/IFC documents as design sources (LA\_DesignSource in LADM terminology) alongside traditional survey sources (LA\_SurveySource in LADM terminology), with guidelines for their use in 3D LAS workflows,
- Use of remote sensing (e.g. LiDAR) and artificial intelligence (AI) for efficient 3D cadastral boundary extraction (LA\_SurveySource),
- 3D LAS dissemination through web-based platforms, mobile applications and AR/ VR interfaces,
- Specialisations of LADM for customary RRRs, such as STDM (UN Habitat's Social Tenure Domain Model), SOLA/ Open Tenure (UN FAO's Solutions for Open Land Administration), and MAST (USAID's Mobile Applications to Secure Tenure), with emerging links to 3D and valuation, and Operational experiences with LADM-based 3D LAS implementations (analysis, lessons learned, identified gaps and opportunities for future development).

Since ISO TC211 has decided on revising LADM (ISO 19152:2012) in 2018, the model has significantly expanded. New components and additional functionalities have been developed. Specifically: a refined (3D) survey and legal model, semantically rich code lists, support for marine space geo-regulations, valuation information, and spatial plan information. This information forms the backbone of a nations' land information infrastructures.

The adoption of active and passive remote sensing techniques (such as RGB and multispectral sensors, LiDAR, RADAR, etc.) has advanced the efficiency and accuracy of spatial data acquisition workflows. In addition, AI methods for cadastral boundary detection and extraction are rapidly maturing.

This progress is reflected in the multi-part second edition of LADM:

- **Parts 1** (Generic Conceptual Model, ISO 19152-1:2024) and **3** (Marine Georegulation, ISO 19152-3:2024) have been published in 2024,
- **Parts 2** (Land Registration, ISO 19152-2:2025), **4** (Valuation Information, ISO 19152-4:2025), and **5** (Spatial Plan Information, ISO 19152-5:2025) have been published in 2025.

Looking ahead, **Part 6** (Implementation aspects) is planned to commence in late 2025 as a joint ISO/TC 211 and OGC activity (SWG LADM).

The research presented here captures early implementation knowledge, documents best practices, and highlights challenges still to be addressed. These lessons will inform the development of LADM Part 6 (Implementation) and contribute to the future evolution of land administration standards worldwide.

The Land Administration Domain Model is gaining recognition in many countries. More than a decade after the first edition of LADM, numerous countries have developed and have implemented (or are implementing) national, country profiles, while software vendors are adopting LADM within their products. While the existing parts of the LADM standard series, 1 to 5, are conceptual information models, and they do not pay attention to implementation aspects. This can be done in various ways, and several platforms and encodings can be used. What are the experiences so far? Which are the lessons learned and what can be re-used as good practice? What are the pitfalls and risks? LADM remains at its core a conceptual information model. Bridging the gap to operational systems requires elaboration (via a country profile) and development of technical models / encodings suitable for implementation. This includes database schema (SQL DDL), data exchange format (GeoJSON, INTERLIS, RDF, XML/GML), and user interface for edit and dissemination. A logical next step is to

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extend standardisation beyond its conceptual domain. Hence, collaboration between FIG, ISPRS, IHO, ISO and OGC provides a strong platform for developing these implementation aspects, envisaged as the core of LADM Part 6.

The contributions in this special issue reflect both novel developments in applying LADM standard series across various countries and practical insights into implementation. Topics range from legal and institutional frameworks, BIM integration, and valuation aspects, to database solutions and user-friendly web dissemination of 3D cadastral data. Together, they demonstrate how LADM is maturing from a conceptual standard into a globally recognised reference architecture for LA, supporting implementation at national and local levels.

## 2. LADM Edition II article collection

The capabilities and functions originally provided by ISO 19152:2012 have been significantly extended and refined through in LADM Edition II. With the publication of its first five parts, the new edition provides standardised models for land registration, marine spaces, valuation information, and spatial plan information, thereby encompassing the full spectrum of LA functions. These structured models provide a foundation for the development of effective LASs and facilitate the integration of diverse, distributed databases and registers, which often remain fragmented and lack interoperability.

It is important to underline that the implementation of LADM is not an end in itself; rather, it serves the purpose of setting up effective LASs that can address and adapt to current, evolving societal, legal, and technological requirements.

The articles assembled in this special issue showcase how the enhanced capabilities of LADM Edition II can be applied and adapted in a variety of national and international contexts. Together, they offer both theoretical insights and practical experiences that highlight progress, identify persistent challenges, and point towards future directions in standardised 3D LA.

This section offers a concise overview and introduction to the contributions that comprise this special issue.

**Zamzuri et al. (2025)** present a structured workflow for integrating BIM/IFC with the LADM to enhance the representation of legal space boundaries in buildings in Sarawak, Malaysia. The study details the extraction of IFC elements and their mapping to LADM classes, followed by structuring for database schema integration. With a focus on strata title management and 3D LASs, the authors' framework addresses the complexities of multi-layered property regimes. They indicate that this research is practically feasible and could be used as a model by other jurisdictions aiming to modernise 3D property registration. They also note that their work is ongoing, with the ultimate goal being fully automated processes and a fully integrated 3D strata database that enables 3D visualisation.

**Tarozzo Kawasaki et al. (2025)** develop an approach to strengthening climate resilience by integrating subsurface data into urban planning via a specialised LADM Part 5 spatial plan information (ISO 19152-5): the climate adaptation profile. As the Netherlands has adopted water and soil as guiding principles for spatial planning, this study addresses a significant gap by establishing coherent linkages between subsurface models and planning processes. The authors evaluate existing models, identify barriers relating to data accessibility and standardisation, and propose a unified framework for the effective integration of subsurface data into urban planning. As part of this framework, they introduce CLIMACAT: an online tool designed to make subsurface data readily accessible for the design of climate adaptation measures. By integrating subsurface geospatial information with urban planning systems, the authors aim to establish a robust foundation for climate-adaptive spatial planning.

**Atulukwu et al. (2025)** propose a 4D marine cadastral data model (MCDM) based on ISO 19152:2012 in order to enhance the management of three-dimensional (3D) marine properties by integrating temporal elements. By incorporating temporal aspects, the authors aim to address the challenges posed by dynamic marine environments, such as shoreline changes and property ownership transitions. MCDM's application to the Terengganu coastline in Kuala Nerus, Malaysia serves as a practical example of how temporal data can be incorporated into marine cadastre systems. Their results indicate that temporal data management is a must for sustainable and effective marine cadastral data administration in coastal regions, and MCDM can be benefitted for this purpose.

**Batum et al. (2025)** streamline the digital transformation of spatial planning by automating compliance checks in the initial stages of the process. By integrating Industry Foundation Classes (IFC) with LADM Part 5 spatial plan information (ISO 19152-5), the research surpasses traditional manual assessments and sets a new framework for efficiency and reliability. Drawing on an Estonian case study, the authors demonstrate how an LADM-based country profile combined with IFC datasets can optimise data management, enhance interoperability, and enable direct, database-driven compliance checks. The results confirm the technical feasibility of accelerating regulatory alignment, thereby improving decision-making in planning systems, demonstrating a significant step towards smarter, more transparent and internationally harmonised spatial planning practices.

**Chehrehbargh et al. (2025)** explore how the LADM can be extended, adapted and implemented to promote economic stability, social equity and environmental sustainability, by integrating global sustainability parameters from the Sustainable Development Goals (SDGs) and Framework for Effective Land Administration (FELA). The authors extend the LADM to encompass gender equality, indigenous land rights, informal tenure, taxation and valuation, thereby aligning LASs with SDGs and FELA. Using Indonesia as a case study, the authors design and implement an enhanced LADM schema that combine technical rigor with social inclusivity. Proof of concept demonstrates the schema's practical value through equity-sensitive queries, such as identifying parcels owned by women or mapping informal settlements. The authors believe that their study enhances the transparency and resilience of Indonesia's land administration system (LA) and provides a scalable blueprint for global adoption.

**Chen et al. (2025)** investigate the extent to which LADM Edition II can be utilised to establish a more integrated and standardised framework for evaluating land governance at global and national levels. The authors introduce a unified approach built on the second edition of LADM, introducing a conceptual model and modular architecture for scalable indicator computation to address persistent challenges of data fragmentation across distributed LASs. The proposed methodology effectively bridges the gap between global policy frameworks and national LASs, providing a pathway for more reliable and actionable monitoring of land governance. By aligning initiatives such as the Land Governance Assessment

Framework (LGAF), the Global Land Indicators Initiative (GLII) and the Sustainable Development Goals (SDGs) within an LADM-compliant LAS, the paper aims to improve international comparability and local applicability in assessing land governance performance.

**Shahidinejad et al. (2025)** present a practical implementation of a 3D cadastral database for Victoria, Australia, built on LADM Edition II and seamlessly integrated with the BIM/IFC to capture both legal and physical spaces. The research covers three stages of modelling: conceptual, logical and physical. The database tackles challenges in processes such as data preparation and transformation, including the derivation of 3D legal spaces and representation of vertical extents such as airspace rights. Using real-world data, the authors evaluate their implementation through advanced 3D spatial queries and realistic visualisations. The authors suggest that integrating LADM Edition II with IFC demonstrates a robust, standards-based approach to LASs, providing a valuable reference for jurisdictions looking to modernise the management of complex 3D property data in line with international standards.

**Stubkjær et al. (2025)** highlight the potential of semantic resources and structured concept hierarchies to advance interdisciplinary collaboration, education and globally consistent land governance practices, and advocate for a more flexible semantic facility to accommodate ad hoc teaching and training tasks. The authors use semantic resources in the global land sector, focusing on Simple Knowledge Organization Systems (SKOS)-based thesauri such as AGROVOC, LandVoc, and CaLAtThe to enhance interoperability across land, surveying, and construction datasets and support e-governance. The authors demonstrate how linking these thesauri with the Teaching Essentials for Responsible Land Administration (TERLA) teaching modules and applying concept mapping to real property law and cadastral courses, complementing LADM Edition II developments and country profile methodologies, can help to improve education and training in land administration. They also share their agreement to integrate CaLAtThe into the LandVoc thesaurus, along with the corresponding implementation steps.

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## References

- Atulukwu, Y.H., Hassan, M.I., and Rahman, A.A., 2025. Development of 3D + T marine cadastre data model – A case study of terengganu shoreline. *Survey review*. <http://doi.org/10.1080/00396265.2025.2544401>
- Batum, S., et al., 2025. Spatial plan registration and compliance checks in Estonia, based on LADM part 5: spatial plan information. *Survey review*, 1–17. <http://doi.org/10.1080/00396265.2025.2547462>
- Chehrehbargh, J., et al., 2025. Advancing sustainable land governance: extending LADM for integrating global initiatives—a case study in Indonesia. *Survey review*, 1–15. <http://doi.org/10.1080/00396265.2025.2543615>
- Chen, M., et al., 2025. Analyzing and formalising land indicators of LGAF, GLII and SDGs through LADM. *Survey review*, 1–20. <http://doi.org/10.1080/00396265.2025.2544400>
- ISO 19152. 2012. Geographic information — Land Administration Domain Model (LADM), 129 pages.
- ISO 19152-1. 2024. Geographic information — Land Administration Domain Model (LADM) — Part 1: Generic conceptual model. 38 pages.
- ISO 19152-2. 2025. Geographic information — Land Administration Domain Model (LADM) — Part 2: Land registration. 162 pages.
- ISO 19152-3. 2024. Geographic information — Land Administration Domain Model (LADM) — Part 3: Marie Georegulation, 54 pages.
- ISO 19152-4. 2025. Geographic information — Land Administration Domain Model (LADM) — Part 4: Valuation information, 62 pages.
- ISO 19152-5. 2025. Geographic information — Land Administration Domain Model (LADM) — Part 5: Spatial plan information, 42 pages.
- Shahidinejad, J., Kalantari, M., and Rajabifard, A., 2025. 3D cadastral database implementation based on LADM edition II and IFC. *Survey review*, 1–13. <http://doi.org/10.1080/00396265.2025.2544404>
- Stubkjær, E., et al., 2025. The governance of global land sector semantic resources - status and pathways. *Survey review*. <http://doi.org/10.1080/00396265.2025.2543611>
- Tarozzo Kawasaki, M.L., et al., 2025. Integrating subsurface data into urban planning for climate adaptation using land administration domain model part 5. *Survey review*, 1–16. <http://doi.org/10.1080/00396265.2025.2539606>
- Zamzuri, A., et al., 2025. BIM/IFC-LADM mapping framework for sarawak country profile. *Survey review*, 1–11. Delft, September 2025. <http://doi.org/10.1080/00396265.2025.2532947>

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