LADM Colombia: A Model-Driven Ecosystem Enabling Digital Twins and Interoperability Toward LADM II

Alvarez Golgi (Colombia) and Joerg Wertli (Switzerland)

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SUMMARY

The technology industry is moving irreversibly toward digital twins that integrate data, workflows, and services within unified territorial environments. Platform alliances and convergences make this clear: Autodesk + Esri connect BIM design with operational GIS; Hexagon unifies capture, modeling, and geospatial/industrial analytics; Bentley Systems / Siemens orchestrate infrastructure life cycles through connected engineering. This current pushes institutions to transcend silos between cadastre, land registry, planning, infrastructure, and public services, enabling near–real-time, cross-domain, traceable decisions with minimal friction.

Alongside the supply of technology, the public sector's demand requires modernization under common rules. Standards become the equilibrium point between innovation and governance, and LADM stands as the strongest example in land administration. Its second edition (LADM II) extends the scope beyond the cadastre–registry dyad to include marine–coastal contexts, land-use planning, valuation, and infrastructure, with semantics and profiles that promote both semantic and transactional interoperability across levels of government and sectors.

Within this frame, Colombia is advancing a Model Driven Architecture (MDA) that, anticipating LADM II, organizes a conceptual core (LADM_COL) and thematic extended models for spatial planning, environment, mining, and other domains. Supported by a decade of Swiss cooperation and the BSF-Swissphoto partnership, this approach produced a documented Land Administration System (SAT), published good practices, and a culture of interoperability, traceability, and citizen service—an enabling base for the evolution toward territorial digital twins.

The challenge now is to balance standards and technology adoption with a convergence that serves human, social, economic, and environmental development. This is not about following digital

fashion, but about ensuring that LADM models, their extensions, and model-driven architectures enable the intelligent management of infrastructures, cities, and countries with transparency, territorial equity, and continuous improvement. The LADM Colombia model ecosystem proposes precisely these enabling conditions for an effective adoption of LADM II, aligning industrial innovation with public policy and delivering measurable outcomes for citizens.