The Guidelines for the Brazilian Multipurpose Cadastre and its Relations with International Frameworks: LADM, STDM, Fit-for-purpose and FELA

Guilherme LINHEIRA, Hatan Pinheiro SILVA, Everton da SILVA, Liane Ramos da SILVA, Francisco Eduardo de Mello Franco SÁ, and Diego Alfonso ERBA, Brazil

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SUMMARY

This paper analyzes Brazil's Ordinance No. 3,242/2022, which establishes guidelines for the multipurpose cadastre, highlighting its alignment with international technical and conceptual frameworks. The research adopts a qualitative, analytical, and documentary approach, focusing on a normative analysis of the Ordinance and documents from institutions such as the International Federation of Surveyors (FIG), ISO, and UN-GGIM. Key structuring aspects of the multipurpose cadastre are emphasized, including the definition of land parcels, parcel certification, the concept of territorial objects, cadastral reference networks, and the creation of a Real Estate Market Observatory. The results demonstrate that the Brazilian regulation reflects significant conceptual advances, incorporating principles such as multipurpose use and fit-for-purpose, while also drawing on national experiences, particularly from the rural context. It is concluded that Ordinance No. 3,242/2022 represents a milestone for cadastral modernization in Brazil, aligning the country with international practices and projecting future challenges related to the adoption of multidimensional cadastres and the integration of emerging technologies.

Palavras-chave: Cadastro Territorial Multifinalitário, Portaria 3242/2022, FIG, LADM, FELA, STDM.

RESUMO

Este trabalho analisa a Portaria nº 3.242/2022, que estabelece diretrizes para o Cadastro Territorial Multifinalitário (CTM) no Brasil, evidenciando seu alinhamento com referenciais técnicos e conceituais internacionais. A pesquisa adota uma abordagem qualitativa, analítica e documental, centrada na análise normativa da Portaria e em documentos produzidos por instituições como a Federação Internacional dos Geômetras (FIG), a ISO e o UN-GGIM. São destacados aspectos estruturantes do CTM, como a definição de parcela territorial, a certificação de parcelas, o conceito de objeto territorial, a rede de referência cadastral e a criação do Observatório do Mercado Imobiliário. Os resultados mostram que a normativa brasileira reflete avanços conceituais significativos, incorporando princípios como multifinalidade e fit-for-purpose, ao mesmo tempo em que dialoga com experiências nacionais, especialmente no meio rural. Conclui-se que a Portaria nº 3.242/2022 representa um marco para a modernização cadastral no país, colocando o Brasil em sintonia com as práticas internacionais e projetando desafios futuros relacionados à adoção de cadastros.

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1. INTRODUCTION

The Multipurpose Cadastre has been studied and implemented in Brazil since the early 1990s. Academically, the first initiative to address the topic in a graduate program was at the Federal University of Santa Catarina, which defined it as a concentration area in 1991. Since then, a significant number of research projects and technological innovation works have been developed in the country. These academic and professional contributions, influenced by advances in international conceptual frameworks, led the federal government to an important initiative aimed at encouraging municipal administrations to implement the Multipurpose Territorial Cadastre: the publication of Guidelines in the form of a ministerial ordinance (Portaria). The first ordinance, No. 511, was published in 2009 by the Ministry of Cities and was replaced in 2022 by Ordinance No. 3242 from the Ministry of Regional Development, which is the focus of this work.

The proposal for the current national multipurpose cadastre guidelines considered recent advances i) in cadastral systems, as seen in academic publications, ii) in monitoring successful experiences in Brazilian municipalities and other countries, iii) in discussions held at relevant events, and iv) in the experience of the Brazilian rural cadastre. Academic publications underpin terminologies such as territorial objects and real estate market observatories. Successful experiences in Brazilian municipalities include database modeling that already considers the parcel as a cadastral management element, with its definition based on mass cadastral surveys, enabling the use of the territorial cadastre for urban policies and citizen services. Discussions at events have guided the simplification of databases by adopting the fit-for-purpose cadastre concept, coined by the International Federation of Surveyors (FIG).

The Brazilian rural cadastre provides the foundation for the terminologies of certified and non-certified parcels. The enactment of Federal Law 10.267/2001, known as the Law for the Georeferencing of Rural Properties, is undoubtedly the most representative legal milestone of Brazilian cadastral advances and follows the international movement led by the FIG since the mid-1990s for cadastral modernization worldwide. This law introduced various cadastral aspects and principles widely applied in other countries. These include: the concept of the parcel as a territorial unit, the adoption of coordinate-based descriptions for parcel boundaries, the connection of coordinates to a single geodetic reference system, the identification of parcels through a unique, unambiguous, and stable code, the establishment of positional accuracy standards for parcel boundaries, and the strengthening of the objective aspect and the principle of speciality in property titles through the accurate description of parcel boundaries, among others. Certified and non-certified parcels are, therefore, concepts and terminologies adapted from the successful application of Law 10267/2001 in rural areas to the urban context,

expressed in Ordinance No. 3,242/2022/MDR. These aspects represent a solution that simultaneously contemplates the identification of legal and actual boundaries and the creation of a single cadastral base with all parcels.
The formulation of the current guidance for the multipurpose cadastre, expressed in Ordinance No. 3,242/2022, results from a historical process that gradually sought to align with principles and guidelines already consolidated internationally. The central objective of this work is to highlight this alignment, emphasizing the main theoretical-methodological aspects incorporated by the Ordinance and their relationship with the guidelines systematized by the International Federation of Surveyors (FIG), an institution that has played a central role in producing and disseminating technical references on territorial cadastre on a global scale.
Methodologically, the research adopts a qualitative, analytical, and documentary approach, based on normative and conceptual analysis. The procedures involved examining Ordinance No. 3,242/2022, combined with a review of the main technical documents published by the FIG, which allowed for the identification of points of terminological and conceptual convergence between the analyzed references. Additionally, publications from the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) are also considered, as its work has stood out in proposing standards and recommendations for geospatial information governance and integration worldwide. To systematize the results, a Synthesis Table of correlations was prepared, comparatively highlighting the relationships between the concepts of the Ordinance and their anchors in international technical frameworks and external references.

2. ORDINANCE 3242/2022: FUNDAMENTAL ASPECTS

The publication of Ordinance No. 3,242/2022 must be understood within a historical process marked by advances and discontinuities in territorial cadastre policies in Brazil. Federal concern with the theme dates back to the 1960s and 1970s, when initiatives such as the Federal Housing and Urbanism Service (SERFHAU) and the CIATA program sought to structure methodologies for real estate-based cadastral surveys, with an eminently fiscal bias limited to calculating the Brazilian property tax “IPTU” (Urban Building and Land Tax). Although relevant, these efforts did not consolidate into a permanent national policy, being interrupted by administrative reforms and budget constraints (CUNHA et al., 2019).
It was only in the early 2000s, with the creation of the Ministry of Cities (2003), that the territorial cadastre agenda was resumed at the federal level. Following a series of seminars and technical workshops, the agency published Interministerial Ordinance No. 511/2009, which represented a milestone by officially introducing the notion of the multipurpose cadastre. However, its legal nature remained advisory, not imposing on municipalities the obligation to implement territorial cadastres.
Although an important milestone for consolidating the debate on the multipurpose cadastre in Brazil, Ordinance No. 511/2009 was developed with reference to highly advanced and consolidated international models, whose full adoption required institutional, technical, and financial conditions that did not correspond to the reality of most Brazilian municipalities. By incorporating rigid concepts and highly complex standards, the regulation ended up imposing practical barriers to its implementation, especially in small and medium-sized cities, which

lacked technological infrastructure, specialized technical staff, and budgetary resources to structure territorial cadastres as proposed (Linheira et. al, 2024).
These limitations highlighted the need for a regulatory review that, without sacrificing conceptual consistency, could offer greater flexibility and suitability to Brazilian conditions. It is in this context that Ordinance No. 3,242/2022 emerges, built from a more pragmatic perspective aligned with the Brazilian reality – thus adhering to the fit-for-purpose principle, seeking to balance technical rigor with application feasibility, and offering a more viable path for the consolidation of the multipurpose cadastre in the country. Thus, the new ordinance can be considered an update of the previous one, realigning its theoretical-methodological approach with international best practices in the field of the multipurpose cadastre.
Ordinance No. 3,242/2022 and its theoretical-methodological approach are the result of a process of gradual evolution of cadastral policy in Brazil: from fragmented and discontinued initiatives in the 20th century, through initial consolidation with Ordinance No. 511/2009, to the incorporation of concepts with greater alignment to the international literature in 2022. Thus, more than a simple regulatory update, Ordinance No. 3,242/2022 signals an attempt to consolidate a modern, multipurpose, and fit-for-purpose oriented territorial cadastre in the country, adjusted to different municipal realities but in tune with global land administration standards (Steudler, 2014).
From the analysis of the content of Ordinance No. 3,242/2022, structuring elements that evidence the operational basis of cadastres were identified. Among them, the following stand out: the definition of multipurpose cadastre; the definition of a territorial parcel, including the differentiation between certified and non-certified parcels; the definition of a territorial object, contemplating the distinction between physical and legal territorial objects; the definition of a Municipal Cadastral Reference Network; and finally, the Real Estate Market Observatory. In this context – as mentioned in the Introduction of this work – it is intended to demonstrate, throughout section 3, how these elements align with the guidelines consolidated by the FIG in its technical publications on the subject.

3. CONCEPTUAL ALIGNMENT OF ORDINANCE NO. 3,242/2022 WITH INTERNATIONAL LITERATURE

3.1. Multipurpose Cadastre

Ordinance No. 3,242/2022 presents in Chapter I, called General Provisions, two articles directed at defining the multipurpose cadastre as an integrated system that combines the official inventory of municipal parcels with thematic information of a social, environmental, housing, infrastructure, tax, among other, nature. Complementarily, it defines that the territorial cadastre constitutes the geometric reference base, guaranteeing the integration and consistency of the different thematic cadastres (Brasil, 2022).
This conception is anchored in the concept presented in the technical report *Cadastre 2014: A Vision for a Future Cadastral System*, organized by Steudler and Kaufmann, published in 1998 by the FIG. The document, based on the experiences of countries like Germany and the Netherlands, which at the time already had integrated cadastral systems, presented guidelines for the future of the cadastre. This approach highlighted the need for cadastres to represent not

only the location and extent of lands but also the associated rights, responsibilities, and restrictions. In this sense, the cadastre came to be conceived as a systematic public inventory of all legal territorial objects, defined by law, with precise delimitation of their contours and individual identification, including information about their nature, size, value, and the pertinent legal rights or restrictions (Steudler; Kaufmann, 1998).

This conceptual update, although seemingly simple, introduced a new paradigm in the use of cadastral systems. Concretely, the cadastre came to be understood as a much more comprehensive tool than the mere function of property registration, assuming a central role in various fronts related to territorial planning and management, besides generating benefits related to the real estate market. In practice, the consolidation of this concept established the initial bases for a process of international convergence, which, as it was gradually adopted by countries, paved the way for discussions on more robust standardizations, aiming to enable data exchange between different countries and territories, as well as the sharing of experiences and best practices.

In the case of Brazil, it is worth noting that Ordinance No. 511/2009 presented a conception of the cadastre with limited alignment with the international vision. Specifically, it restricted its approach and description of lands to territorial parcels, without clearly explicating the process of incorporating the associated rights, restrictions, and responsibilities. In this sense, Ordinance No. 3,242/2022 overcame these limitations by incorporating the notion of territorial objects and fully aligning with the definitions established in the international scenario.

3.2. Territorial Parcel

The use of the parcel as a cadastral unit has a long tradition in different countries. In continental Europe, for example, the Napoleonic cadastre in France established, in the early 19th century, the *cadastre parcellaire*, defining the parcel as the basis for taxation, agrarian management, and territorial regulation (Kain et al., 2023). In Switzerland, the cadastral system covers all parcels, including roads and public areas, recognizing them as full cadastral units, endowed with legal, ownership or institutional representation, used for multiple purposes, from urban planning to environmental management (Seiler, 2017). Similar experiences can be observed in countries like Sweden, Canada, and Australia, where the parcel constitutes the basis for multipurpose systems, articulating geospatial information and legal records, serving as a model for subsequent international formulations (Kaufmann, 2017).

The modern conceptual outline of territorial parcels was also consolidated by the "Cadastre 2014" document. In this case, the territorial parcel consists of the fundamental cadastral unit, originating from the legal recognition of the relationship between people and land, being geometrically delimited by geodetic coordinates. Furthermore, the territorial parcel is the base unit to which territorial objects are linked, which consist of entities used to delimit the rights, restrictions, and responsibilities that eventually affect the parcel. Thus, the modern conception treats the parcel not only as a physical unit but as an organizing unit of territorial information, capable of supporting multiple administrative and public policy applications (Steudler; Kaufmann, 1998).

The consolidation of this understanding of the territorial parcel enabled the development of the Land Administration Domain Model (LADM), transformed into an international standard in 2012 (ISO 19152:2012). The LADM constituted itself as a data model and a semantic and IT

framework intended for the standardized organization of geospatial and legal-administrative information on land, using the territorial parcel as the basic informational unit.
Concretely, the LADM operationalizes the conceptual approach introduced by Cadastre 2014, offering a systematic and computerized basis for modern land management. By defining classes and relationships (e.g., spatial units, actors/parties, rights, and restrictions), the LADM also enabled interoperability between systems, facilitating the exchange, integration, and automated processing of cadastral data – essential conditions for the implementation of multipurpose territorial cadastres and for enhancing their capabilities as information infrastructure. Thus, the expanded conceptualization of the parcel and its operational formalization in the LADM provided both the theoretical foundation and the technical-computerized framework that allow today the articulation between spatial representation, legal records, and thematic bases.
In the Brazilian context, Ordinance No. 511/2009 defined the territorial parcel essentially as a cadastral unit derived from its geometric representation and descriptive attributes, still maintaining a strong link with the notion of an urban lot or rural property. This conception, although already seeking to contemplate the multipurpose nature of the cadastre, remained limited to the recording of spatial features for administrative use, without explicitly detailing the association with rights, restrictions, and responsibilities.
With the publication of Ordinance No. 3242/2022, a conceptual advance is observed, in line with international references. The notion of the parcel now explicitly incorporates the idea of a legal and administrative spatial unit, whose relevance is not restricted to geometry, but to its function as a basis for territorial governance. Thus, the current regulation approaches the LADM recommendations by recognizing the parcel as the core for the integration of spatial, legal, and management information, reinforcing its centrality in the structure of the multipurpose cadastre. The transition from Ordinance No. 511/2009 to Ordinance No. 3242/2022 reveals, therefore, a significant change: from a predominantly geometric and descriptive view of the parcel to an expanded conception, guided by the perspective of land administration and the multipurpose nature of the cadastre – in line with the path historically taken by countries that consolidated the parcel as the basis of their cadastral systems decades ago.

3.3. Parcel Certification

The introduction of parcel certification in Ordinance No. 3242/2022, with the distinction between certified and non-certified, finds a parallel in international discussions on the quality and reliability of cadastral information. Steudler (2014), when updating the principles of Cadastre 2014 towards Cadastre 2030, emphasizes that the effectiveness of land administration systems depends directly on the quality assurance of cadastral information. This perspective also connects to the *fit-for-purpose* principle, consolidated in the technical guide "*Fit-For-Purpose Land Administration*", organized by Enemark *et. al* and published by the FIG in 2015. The principle establishes that land administration and cadastre systems should be developed in a flexible, inclusive manner adapted to the socioeconomic context of each country, prioritizing low-cost solutions, rapid implementation, and broad coverage. Thus, instead of adopting overly complex and costly models, the focus proposes that systems be built to meet the immediate needs of society and can be gradually improved over time, guaranteeing formal and informal recognition of rights, restrictions, and responsibilities over land.

In Brazil, the experience of the Rural Property Cadastre, managed by INCRA, had already introduced certification as a central element of cadastral reliability. Since the early 2000s, land and environmental legislation began to require that rural properties be georeferenced and certified by INCRA, as established by Decree No. 4,449/2002 and subsequent regulations. This requirement resulted in the development of the Land Management System – SIGEF, implemented in 2013, which automated the technical analysis and validation of the declared boundaries of rural properties. Certification, in this context, ensures that the geometry presented by the owner or occupant does not overlap other already certified properties, reinforcing the spatial consistency of the rural cadastral base and increasing the legal security of the records.
This experience contributed to consolidating in Brazil the notion that cadastral certification is an essential condition for the integration between spatial data and legal records. Within the scope of Ordinance No. 3242/2022, the introduction of the distinction between certified and non-certified parcels can be interpreted as an extension of this logic already consolidated in rural areas to the multipurpose cadastre. In line with *fit-for-purpose*, the Ordinance recognizes that, at an initial stage, the coexistence of non-certified parcels is admissible, to enable the implementation of the system. However, it also establishes the perspective of a gradual process of replacing non-certified parcels with certified ones, so that, at a more advanced stage, the multipurpose cadastre is composed exclusively of certified parcels.
Thus, parcel certification, while connecting to international trends of cadastral quality assurance, directly dialogues with the Brazilian experience in rural areas, constituting an important step towards strengthening the country's territorial governance.

3.4. Territorial Object

The concept of a territorial object, understood as a thematic element intended to identify rights, restrictions, and responsibilities, is in direct alignment with the Land Administration Domain Model (LADM), whose core structure is organized precisely around the RRR triad (Rights, Restrictions, Responsibilities) (ISO 19152:2012). This model establishes that not only the geometry of the parcel should be recorded, but also the totality of legal and administrative relations that affect the territory. By adopting such a perspective, the LADM provides the basis for cadastral systems capable of integrating legal, technical, and social information into a single conceptual structure.
This formulation also materializes the vision of *Cadastre 2014*, which argues that public restrictions on land use – such as permanent preservation areas, risk zones, listed heritage sites, or areas of urbanistic interest – should be registered with the same level of importance as private rights (Steudler; Kaufmann, 1998). This position represented a significant change from the tradition of cadastres focused only on individual property, recognizing that public interests also configure legitimate relations over the territory.
In the same sense, the Report *The Social Tenure Domain Model*, organized by Lemmen and published by the FIG in 2010, stands out. The model, known by the acronym STDM, emphasizes the need to register social tenure arrangements, recognizing the diversity of existing forms of territorial appropriation, especially in contexts of urban and rural informality (FIG, 2010). This perspective broadens the scope of land administration by admitting that tenure security does not derive exclusively from formal registration but can be guaranteed based on social practices recognized by the community.

In the Brazilian case, the incorporation of the territorial object concept by Ordinance No. 3242/2022 represents a significant advance by proposing a structure capable of integrating multiple thematic elements related to the territory, overcoming the traditional exclusive emphasis on parcel geometry. This approach is particularly relevant in a country marked by the recurrence of possession as a form of land occupation, a situation that challenges cadastral models centered only on formal property. By recognizing real rights, administrative restrictions, and environmental and urbanistic responsibilities as constitutive dimensions of the multipurpose cadastre, the possibility is created to include and legally represent the plurality of existing relations between society and territory. In this way, the multipurpose cadastre expands its capacity to support public policies, promote social justice, confer greater transparency to territorial management, and offer instruments more adequate to the national land reality, while simultaneously bringing Brazil closer to international recommendations and best practices.

3.5. Cadastral Reference Network

The geometric dimension constitutes one of the central foundations of any cadastral system, as it ensures the precise and consistent representation of parcels in space. Since the publication of the *Cadastre 2014* document (FIG, 1998), it has been emphasized that the reliability of cadastres depends on the existence of a robust geodetic reference network, capable of guaranteeing spatial integrity and the comparability of information between different sources and levels of government. Thus, the notion that geometric precision is not just a technical requirement but a structural requirement for the effectiveness of the Multipurpose Cadastre was consolidated internationally.

This guideline was deepened in the *Framework for Effective Land Administration* (FELA), a document published in 2020 by the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM). FELA aims to provide an international reference to support countries in modernizing their land administration systems, guiding them regarding principles, components, and best practices. In this context, it is emphasized that the robustness of the geodetic reference is an essential pillar, as it depends not only on cartographic accuracy but also on the legal and administrative security of cadastres. The fact that this recommendation comes from a UN body reinforces its global legitimacy and impact, promoting convergence between different nations around minimum standards of spatial reliability.

In the Brazilian case, the official base to meet this principle is the Brazilian Geodetic System (SGB), maintained by IBGE. The SGB constitutes the national geodetic infrastructure, composed of a set of reference stations (GNSS), geodetic markers, and leveling networks that materialize the Geocentric Reference System for the Americas (SIRGAS2000) in the territory. This structure enables the precise determination of coordinates, serving as the basis for all topographic and cartographic surveys in the country. However, the continental dimension of the Brazilian territory, the diversity of regional conditions, and the need for continuous maintenance of the network represent significant challenges for the consolidation of homogeneous and easily accessible coverage in all municipalities.

It is in this context that Ordinance No. 3242/2022 introduces an important guideline: the mandatory linking of parcels to a municipal cadastral reference network and, in its absence, to the SGB. This determination strengthens the geometric precision of cadastres, ensures their interoperability with other databases, and promotes the reliability of territorial information.

Furthermore, it functions as a stimulus for municipalities to create and maintain their own reference networks, expanding local capacity for territorial management and promoting the decentralization of the cadastral process.
In addition, Brazil has the recent publication of NBR 14166:2023 – Municipal Cadastral Reference Network, by the Brazilian Association of Technical Standards (ABNT). This standard establishes technical requirements for the implementation, maintenance, and use of cadastral reference networks, guiding everything from the choice and material of markers to positioning methods and precision specifications. The NBR represents an essential regulatory milestone for national standardization, providing clear parameters for states and municipalities to structure their networks, to integrate them into the SGB and, at the same time, meet local territorial management needs.
In the Brazilian case, the experience of implementing municipal cadastral reference networks is still uneven: in large cities, the consolidation of local geodetic markers is observed, while in small and medium-sized municipalities, dependence on the SGB prevails. The normative provision of Ordinance No. 3242/2022 constitutes, in this sense, a stimulus for the creation and maintenance of municipal networks, strengthening local capacity for territorial management and promoting greater decentralization of the cadastral process. This movement evidences that Brazil is in a process of institutional and normative strengthening in the geodetic field, aligning with international orientations and, at the same time, seeking solutions to the challenges inherent to its territorial reality.

3.6. Real Estate Market Observatory

The Multipurpose Cadastre has a strategic function that goes beyond the legal and geometric aspects of property, also reaching the economic and real estate sphere. In emerging countries like Brazil, where urban and rural dynamics are strongly impacted by processes of land valorization, speculation, and inequality in access to housing, the integration of cadastral information with market data is fundamental to subsidize fairer and more effective public policies. The property tax (IPTU), the main source of tax revenue for many municipalities, exemplifies the relevance of this dimension: its calculation base depends on the venal value of properties, which should reflect market prices. However, the outdatedness and lack of systematic updating of these values often compromise both municipal revenue and fiscal equity, reinforcing the need for institutional mechanisms for continuous monitoring of the real estate market.
In this context, the creation of the Real Estate Market Observatory, provided for in Ordinance No. 3242/2022, represents a relevant innovation by explicitly incorporating the economic dimension into the multipurpose cadastre. It is a structure intended for the collection, organization, and storage of data on the real estate market, allowing for the monitoring of the evolution of land prices, transactions, and land occupation dynamics in municipalities. This guideline resonates with international recommendations that assign the cadastre a central role in promoting transparency and efficiency in the land market. This vision is supported by FIG's *Cadastre 2014*, which already highlighted the importance of cadastres capable of integrating economic information, to support fair taxation and efficient land management.
In a more recent context, the *Framework for Effective Land Administration – FELA* (UN-GGIM, 2020) includes land market analysis within the scope of effective land administration,

recognizing that monitoring real estate dynamics is an essential component for subsidizing public policies on housing, infrastructure, spatial planning, and taxation.
In the Brazilian case, the institution of local market observatories can contribute to facing historical challenges related to real estate speculation, lack of transparency in land transactions, and the difficulty of integrating economic and cadastral data. By linking the Observatory to the Multipurpose Cadastre, the Ordinance points to a model in which cadastral information is not restricted to the function of geometric and legal recording but also begins to directly support the formulation and monitoring of urban and rural policies, strengthening territorial governance.

4. ANALYTICAL SYNTHESIS

The comparative analysis conducted throughout this chapter demonstrates that Ordinance No. 3,242/2022 consolidates a significant conceptual evolution, aligning the Brazilian Multipurpose Cadastre in a structured way with the most advanced international technical references. As synthesized in Table 1, each fundamental aspect of the new regulation finds direct support in paradigmatic documents produced by FIG, ISO, and UN-GGIM.

Table 1. Synthesis of the conceptual alignment between Ordinance No. 3242/2022 and FIG/UN technical documents

Conceptual Aspect (Ordinance No. 3,242/2022)	*International Technical Reference Document*	*Main Points of Alignment*
Multipurpose Cadastre	FIG - *Cadastre 2014*	Vision of the cadastre as an integrated public inventory, going beyond property registration to be a data infrastructure aimed at territorial planning and management.
Territorial Parcel	FIG - *Cadastre 2014*; ISO 19152:2012 - LADM	Concept of the parcel as the basic legal-administrative spatial unit, the core for the integration of spatial, legal, and management information.
Parcel Certification	FIG - *Fit-For-Purpose Land Administratio*n	Adoption of a flexible and evolutionary model (certified vs. non-certified), prioritizing initial coverage and continuous improvement of data quality and reliability.
Territorial Object	ISO 19152:2012 - LADM and FIG/UN-Habitat - STDM	Incorporation of the Rights, Restrictions and Responsibilities (RRR) triad, allowing the representation of formal and informal relationships with land.

Cadastral Reference Network	FIG *Cadastre 2014*; UN-GGIM - FELA	Emphasis on robust geodetic infrastructure as a pillar for geometric precision, interoperability, and legal security of the cadastre.
Real Estate Market Observatory	FIG - *Cadastre 2014* and UN-GGIM – FELA	Integration of the economic dimension into the cadastre, promoting transparency in the land market and support for fiscal and planning policies.

The conception of the Multipurpose Cadastre is anchored in the prospective vision of *Cadastre 2014*. The redefinition of the Territorial Parcel as a legal-administrative unit operationalizes the concepts of the LADM, while the distinction between Certified and Non-Certified Parcels pragmatically incorporates the *fit-for-purpose* principle. The introduction of the Territorial Object materializes the triad of Rights, Restrictions, and Responsibilities (RRR), central to the LADM and STDM, allowing the cadastre to represent the complexity of society-territory relationships. The requirement for a robust Cadastral Reference Network meets the FELA guidelines, and the provision of a Real Estate Market Observatory integrated with the CTM incorporates the economic dimension, as recommended by both *Cadastre 2014* and FELA.
In summary, Ordinance No. 3,242/2022 positions Brazil in tune with the global movement that conceives cadastres not as mere static records, but as dynamic information infrastructures, essential for transparent, efficient, and equitable territorial governance, and guided by the principles of multipurpose use and fitness for purpose.

5. FUTURE PERSPECTIVES

Ordinance No. 3,242/2022 establishes a solid conceptual and operational foundation for the Multipurpose Cadastre in Brazil, aligning it with contemporary international best practices. However, the acceleration of the urbanization process and the advent of smart cities demand a continuous evolution of land administration systems. The future of the cadastre points towards the incorporation of new dimensions that capture the complexity of modern urban space, going beyond the 2D paradigm.
In this context, the implementation of 3D and 4D Cadastres emerges not as a mere technological innovation, but as a practical response to the management needs of complex urban structures. As highlighted by Polat and Ustuner (2015), the 3D cadastre is fundamental for representing and managing rights, restrictions, and responsibilities (RRR) over specific spatial volumes, solving problems of overlapping rights in high-density environments. Its application is crucial for:

- Complex Horizontal Property: Precisely representing vertically overlapping autonomous units, such as in shopping centers, airports, and mixed-use complexes, where different properties or usage rights coexist in the same location.
- Underground and Aerial Infrastructures: Clearly registering rights over tunnels, footbridges, galleries, and utility networks, which are essential for the functioning of a sustainable city.

- Air and Subsoil Rights: Enabling the independent management of space above and below the surface, a critical economic asset in consolidated urban areas.

The temporal dimension, which characterizes the 4D Cadastre, allows the management of the complete lifecycle of territorial assets, from project and construction to demolition, supporting a more dynamic and predictive urban management. The LADM (ISO 19152), which already provides a conceptual basis for 3D modeling, is the natural reference to guide this transition, ensuring the necessary standardization and interoperability.

Furthermore, the integration of the cadastre with other disruptive technologies is an inevitable path. The connection between Multipurpose Cadastre and Building Information Modeling (BIM) can create a "digital twin" of the built environment, where the cadastre manages the legal aspects and BIM models the physical and functional attributes of buildings. This symbiosis is a pillar for smart cities, enabling integrated management of energy, infrastructure maintenance, emergency response, and sustainable urban planning.

Finally, the consolidation of the CTM as the central component of the National Spatial Data Infrastructure (INDE) for territorial governance is the strategic goal. In this vision, the multidimensional and integrated cadastre acts as the main thematic reference platform of the INDE – a reliable and dynamic database that supports evidence-based decisions in critical areas such as mobility, housing, environmental protection, and disaster resilience. The multipurpose cadastre thus ceases to be a sectoral system to become a public utility, the 'nervous system' of the national territory within the spatial data infrastructure.

The journey of cadastral modernization initiated by Ordinance 3.242/2022 is, therefore, not complete. It prepares the ground for Brazil not only to match current standards but also to embrace the next frontier of land administration: a multidimensional and dynamic cadastre, positioned as critical infrastructure for the development of sustainable and smart cities.

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BIOGRAPHICAL NOTES

Guilherme Linheira is a geographer (UFSC), Master's and PhD in Territorial Planning and Socioenvironmental Development (PPGPLAN/UDESC). Experience in teaching, research, and consulting in the areas of Cartography, Geoprocessing, Planning, and Territorial Management. Currently, he works as a Technologist in Geographic and Statistical Information at the IBGE Superintendence in Goiás.

Hatan Pinheiro Silva is a Master's student in the Graduate Program in Transportation Engineering and Land Management at the Universidade Federal de Santa Catarina (UFSC). He holds a BA in Geography (2019) from UFSC and a Specialization in Information Technology Management (2024) from the Universidade do Vale do Itajaí (UNIVALI). He is a member of the Territory Observation and Transformation Group (GOTT - UFSC) and the Protected Areas Observatory (Observa - UFSC). He has experience in Cartography, Remote Sensing, Geoprocessing, and Unmanned Aerial Vehicles, with an emphasis on Multipurpose Cadastre and Territorial Management.

Everton da Silva holds a degree in Surveying Engineering from the União das Faculdades de Criciúma (1992), a Master's in Civil Engineering (1996) and a PhD in Production Engineering (2006) from the Universidade Federal de Santa Catarina (UFSC) where he is a Professor in the Department of Geosciences and the Graduate Program in Transportation Engineering and Territorial Management within in the multipurpose cadastre research line. He has coordinated cadastral survey works and mass appraisal of properties for fiscal purposes in several Brazilian municipalities. He is an Associate Professor at the Lincoln Institute of Land Policy, where he collaborates on distance and in-person courses. He is of the CTM Community (ReDus). He is the leader of the Territory Observation and Transformation Group - GOTT.

Liane Ramos da Silva is an Associate Professor in the Department of Civil Engineering at the Federal University of Santa Catarina (since 2015). She holds a PhD in Civil Engineering (2005) and a Master's in Production Engineering (1999) from UFSC, focusing on multipurpose technical cadastre and land management. She earned her degree in Civil Engineering from the University of Amazônia (1996). She has coordinated numerous cadastral survey and mass property valuation projects for fiscal purposes in Brazilian municipalities. Her expertise lies in geomatics, encompassing cartography, multipurpose cadastre, property taxation, topographic surveys, and geoprocessing. She serves as Vice-Leader of the Territory Observation and Transformation Group (GOTT), and is a member of the CTM Community (ReDus).

Francisco Eduardo de Mello Franco Sá holds a degree in Architecture and Urban Planning from Universidade Santa Úrsula (2018) and a degree in Industrial Design from Universidade Positivo (2015), including one year of study abroad at the University of Illinois at Urbana-Champaign in the United States (2012-2013). He also holds a Master's degree in Transportation Engineering and Land Management at the Universidade de Federal Santa Catarina and is a research fellow of the Territory Observation and Transformation Group (GOTT). He has worked with architecture and urban planning projects in both private firms and public

companies. His investigations include GIS, multipurpose cadastre, urban policies, artificial intelligence, BIM, and parametric design.

Diego Alfonso Erba is a Land Surveyor Engineering from Universidad Nacional de Rosario, Argentina (1987). Master Science in Remote Sensing from Universidade Federal de Santa Maria, Brazil (1993) and Master Science in Multipurpose Cadastre from Universidade Federal de Santa Catarina, Brazil (1995). Doctor in Surveying Sciences from Universidad Nacional de Catamarca, Argentine (1998). He did Postdoctoral research in GIS for Water Bodies at Natural Resource Center of Shiga University, Otsu, Japan (2000), a Postdoctoral research in GIS for Urban Applications at LabClark IDRISI of Clark University, Massachusetts, USA (2003) and Postdoctoral research in Urban Cadastre at the Universidad Andina Simón Bolívar, Quito, Ecuador (2015).

CONTACTS

Guilherme Linheira
Instituto Brasileiro de Geografia e Estatística
BRAZIL
E-mail: guilherme.linheira@hotmail.com
Website: http://gott.ufsc.br/

Hatan Pinheiro Silva
Universidade Federal de Santa Catarina
Rua João Pio Duarte Silva, 205
Florianópolis
BRAZIL
E-mail: hatanpinheiro@gmail.com
Website: http://gott.ufsc.br/

Everton da Silva.
Universidade Federal de Santa Catarina, Departamento de Geociências - CFH
Campus Universitário Reitor João David Ferreira Lima
88040970, Florianópolis, BRAZIL
Phone: 55 (48) 37218596
E-mail: everton.silva@ufsc.br
Homepage: http://gott.ufsc.br/

Guilherme Linheira
Instituto Brasileiro de Geografia e Estatística
BRAZIL
E-mail: guilherme.linheira@hotmail.com
Website: http://gott.ufsc.br/

Francisco Eduardo de Mello Franco Sá
Universidade Federal de Santa Catarina
Rua João Pio Duarte Silva, 205
Florianópolis, BRAZIL
E-mail: franciscoeduardo.mfsa@gmail.com
Website: http://gott.ufsc.br/

Liane Ramos da Silva.
Universidade Federal de Santa Catarina, Departamento de Engenharia Civil - CTC
Campus Universitário Reitor João David Ferreira Lima
88040970, Florianópolis, BRAZIL
Phone: 55 (48) 37212397
E-mail: liane.ramos@ufsc.br
Homepage: http://www.labfsg.ufsc.br/