Beyond the Land Administration System. Let's Talk About Land Management!

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Key words: LAS, Land Administration System, Multipurpose Cadastre, LADM

SUMMARY

Land administration is one of the paradigms that has dictated the guidelines for modernizing cadastral processes including tenure relations, value, use, and development over the last few decades. In the case of Colombia, in 2017, the multipurpose cadastre public policy proposed a roadmap to modernize cadastre management, property registration, and processes related to formalization to comply with the peace agreements, including the adoption of the LADM - ISO 19152:2012 standard. However, in 2020, Colombia added a systemic vision policy, and rather than calling it a “Land Administration System,” it was called a "Territory Administration System (SAT).”

Land and territory have different dimensions and implications. While land is usually associated with soil as a right of access, territory implies aspects of governance in decision-making, in terms of soil as a resource, land as a legal relation, and space-time as a context in which different stakeholders participate. In addition, modernizing the territory means going beyond simply managing information. In addition to incorporating more technological solutions, it also involves streamlining the processes and procedures through which citizens access public services.

Colombia's (SAT) model is based on Ian Williamson's proposal, "Land Administration System for Development," published between 2007 and 2010. The model aims to characterize land administration as an integrated system that processes information inputs as part of a Spatial Data Infrastructure (SDI), fulfilling four main functions: value, tenure, use, and development. This system, which IS NOT SOFTWARE, must initially comply with these main functions of land administration. Additionally, as part of a land policy adapted to the country context, it should provide information services as a reliable knowledge base for planning the country or region’s sustainable development.

Colombia’s Territory Administration System (SAT) aspires to be a policy that integrates the different modernization efforts related to territory management. This was adopted through the public policy CONPES 4007, which establishes a gradual transformation commitment involving multiple actions grouped into four major macro-processes: information

management, institutional interoperability, on-demand services, and improvement in decision-making about territories. Decision-making about territories is possibly the most significant variant between Colombia's land vision and the territory vision model, characterizing the current "As-Is" version, which diagnoses the existing ecosystem problems and offers a "To-Be" proposal for the ideal operating model.

This article presents the vision, processes, and progress to date of what Colombia calls the Territory Administration System (SAT). In addition, it presents the potential opportunities and advantages found when Colombia views territory management with a systemic vision in which modernization not only aims to improve information or adopt more technology, but also improve processes and procedures that impact citizen services.

RESUMEN

La Administración de Tierras es uno de los paradigmas que ha dictado las pautas para la modernización de procesos catastrales en las relaciones de tenencia, el valor, el uso y el desarrollo, en las últimas décadas. En el caso de Colombia, la política pública de Catastro Multipropósito planteó desde 2017 una hoja de ruta para modernizar la gestión del catastro, registro de la propiedad y sus procesos vinculados a la regularización en pro del cumplimiento de los acuerdos de paz; incluida la adopción del estándar LADM - ISO 19152:2012. Pero en 2020 Colombia adiciona una política de visión sistémica, y más allá de llamarlo Sistema de Administración de Tierras le llama "Sistema de Administración del Territorio" (SAT).

Tierra y Territorio conlleva dimensiones e implicaciones diferentes. Mientras la tierra suele asociarse al suelo como derecho de acceso, el territorio implica aspectos de gobernanza en la toma de decisiones tanto del suelo como recurso, la tierra como vínculo de derecho y el espacio-tiempo como un contexto sobre el que participan diferentes actores. Adicionalmente, modernizar el territorio conlleva a pensar no solamente en gestionar la información; más que incorporar más soluciones tecnológicas, también volver más eficiente la operación de procesos, procedimientos y trámites por medio de los cuales el ciudadano accede a los servicios públicos.

El modelo del SAT de Colombia se basa en planteamiento de Ian Williamson; "Sistema de Administración de Tierras para el desarrollo", publicado entre 2007 y 2010. El modelo busca caracterizar la Administración de Tierras como un sistema integrado que procesa entradas de información, como parte de una Infraestructura de Datos Espaciales (IDE), cumpliendo con cuatro funciones principales: valor, tenencia, uso y desarrollo. Este sistema, que NO ES UN SOFWARE, debe cumplir como premisa inicial con estas funciones principales de la Administración de tierras. Adicionalmente, en el marco de una política de tierras adaptada al

contexto de país, debe producir servicios de información como una base confiable de conocimiento para la planificación del desarrollo sostenible de una región o del país.

El Sistema de Administración del Territorio SAT de Colombia aspira a ser una política integradora de los diferentes esfuerzos de modernización relacionados con la gestión territorial. Esto se adoptó mediante la política pública denominada CONPES 4007, en la que se establece una apuesta de transformación gradual, que implica múltiples acciones agrupadas en cuatro grandes macroprocesos: Gestión de la Información, Interoperabilidad institucional, Servicios de demanda y Mejora en la toma de decisiones sobre el territorio. Esto último (toma de decisiones sobre el territorio) constituye posiblemente la variante más significativa entre la visión Tierra y Territorio del modelo de Colombia, que en la etapa actual caracteriza la versión *As-Is* donde se diagnostica la problemática del ecosistema existente y una propuesta *To-Be* del modelo de operación ideal.

Este artículo presenta la visión, procesos y avances a la fecha en lo que Colombia denomina Sistema de Administración del Territorio SAT. Adicionalmente, presenta las potencialidades y ventajas encontradas cuando el país visualiza la gestión del territorio bajo una visión sistémica donde la modernización no solo apunta a la mejora de la información o adopción tecnológica sino también a la mejora de los procesos y procedimientos que impactan en los servicios al ciudadano.

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INTRODUCTION

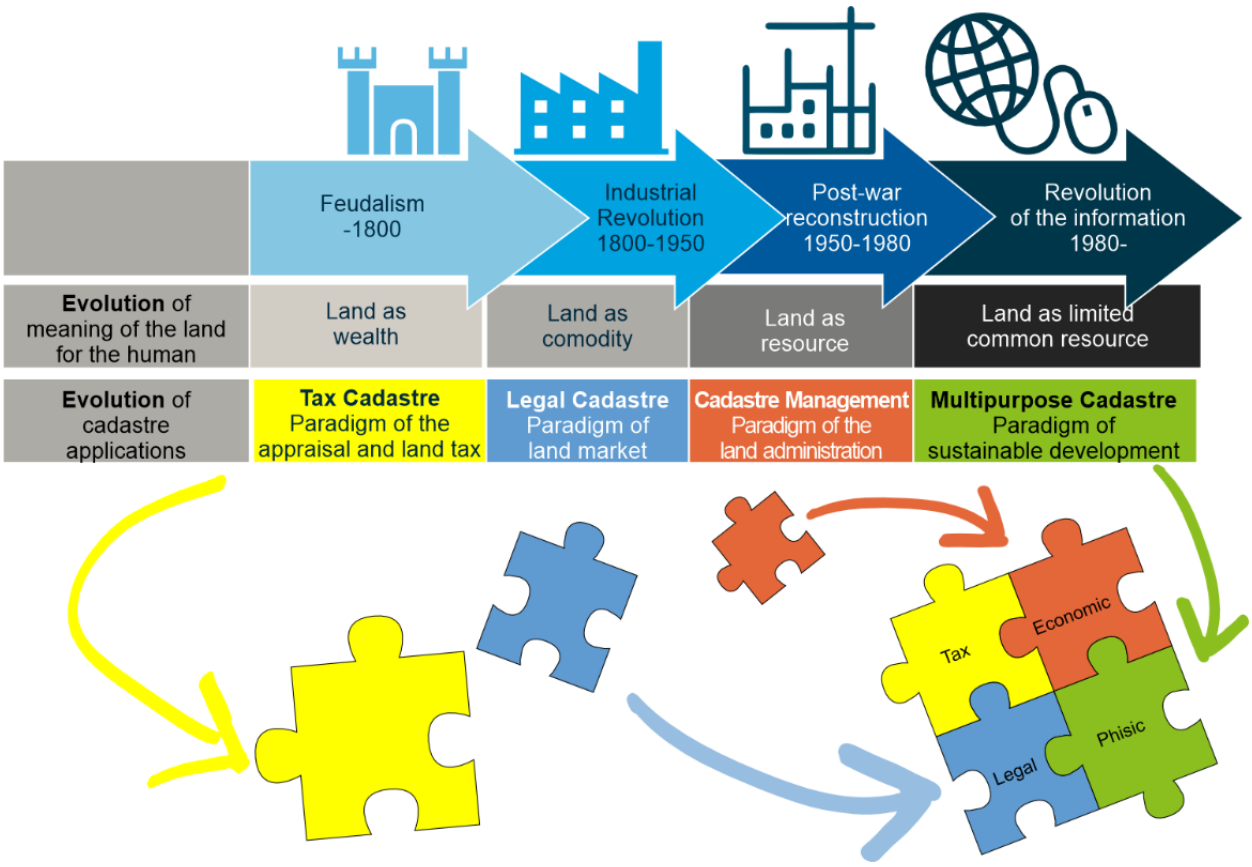
The process of managing, supervising, and controlling land use to maximize its value and sustainable use is known as Land Administration. This includes activities such as spatial planning, allocating land use rights, regulating construction, conserving land, and managing forests.

Unlike in English, the term “land” can have more than one connotation in Spanish. Land can be understood as the resource, and it can be associated with the surface right to soil; the term can also be understood as a territory - the space where society has set the rules for its development. Therefore, terms such as LADM *(Land Administration Domain Model*) have

the potential to be understood in several different ways, depending on if we define it as a resource, surface rights, land or territory. If these concepts are not defined in accordance with a country's legislation, a modernization process could become complicated.

The modernization of land management generally aims to guarantee an equitable and sustainable use of natural resources, although these concepts have not always been understood in the same way throughout history. This becomes clear when reviewing the paradigms that have governed the way in which human beings value land, as shown in the Figure 1.

Figure 1. Evolution of the Cadastre Paradigm



Source: Adapted by SwissTierras from TwinGEO Magazine (Alvarez, 2017)

- **The paradigm of appraisal and land tax – Meaning: Land as wealth.** This was the initial vision of the Cadastre, from the feudalist period until around year 1,800. In

some ways, this set the tone for the fiscal vision of the Cadastre which is currently widespread in places such as Latin America.

- **The land market paradigm – Meaning: Land as a commodity.** This occurred during the industrial revolution — from around 1,800 until 1,950 — resulting in the legal approach to modernization, given the need to guarantee the right to property as an exchangeable good.
- **The land administration paradigm – Meaning: Land as a resource**. This happened in the post-World War II reconstruction era, between 1,950 and 1,980. Many modernization exercises focused on defining the multiple aspects of the physical cadastre; this is important because the concept of "land administration" is used here.
- **The multipurpose Cadastre paradigm – Meaning: Land as a limited shared resource.** This paradigm occurs within the framework of the information revolution, starting in year 1,980. In some ways, it aims to associate modernization with global agendas, such as the millennium goals and sustainable development goals. (UN, 2015)

Unlike developed countries — where comprehensive land management was established after social pacts were put in place because of war crises, the fall of imperial powers, and geographic reconfiguration — these elements were gradually assembled in developing countries — in many cases through separate institutional management in the form of small fiefdoms. Therefore, the concept of the "multipurpose Cadastre" is a goal that has yet to be reached; the current challenge is how to integrate and ensure consistent land administration that aims to develop the municipalities, regions, and the country.

Currently, many Latin American countries still maintain a Cadastre focused on tax collection, which is separate from the property registry. Even in some countries where the Cadastre-registry integration has been implemented, there are still great challenges around updating the information at the national level and, above all, simplifying the processes derived from the Cadastre's main input functions, such as value, tenure, use, and development. In most cases, the Cadastre complies with private law's management of the cadastral inventory. Informality is not considered a priority, and the inventory of public law land objects is not considered to be a responsibility related to land management and administration.

The great challenge is to create a systemic vision for all land-related processes, which includes how to manage the information stakeholders need for their decision-making process and how to simplify processes and procedures in order to efficiently provide citizens with the services they need. In short, a Land Administration System (LAS) must be conceived as a machine that can be optimized.

1. THE CADASTRE AS A NECESSITY FOR KEEPING PEACE IN COLOMBIA

Even though cadastral management has been carried out in Colombia since the 1,930s, in many ways, it suffers from the same complications experienced by other Latin American countries. For example, the clientelism of party politics, the lack of continuity in long-term planning, and the limited focus on decentralization have led to high levels of informality in land tenure, unequal access to the earth, deficient provision of services to the citizen, conflicts between rights, restrictions and responsibilities, and administrative bureaucracy — all of which have inevitably negatively impacted citizen and in the impossibility of consolidating a peaceful society. The following table includes some general figures for Colombia.

Figure 2. Colombian Context

Country: Colombia **Area**: 1,141,748 Km^2 **Population**: 52.1 million inhabitants **Capital**: Bogotá **Bogotá Population**: 7.9 million inhabitants **Poverty line**: 27.8% **Gini Index**: 53.0		

Source: Wikipedia

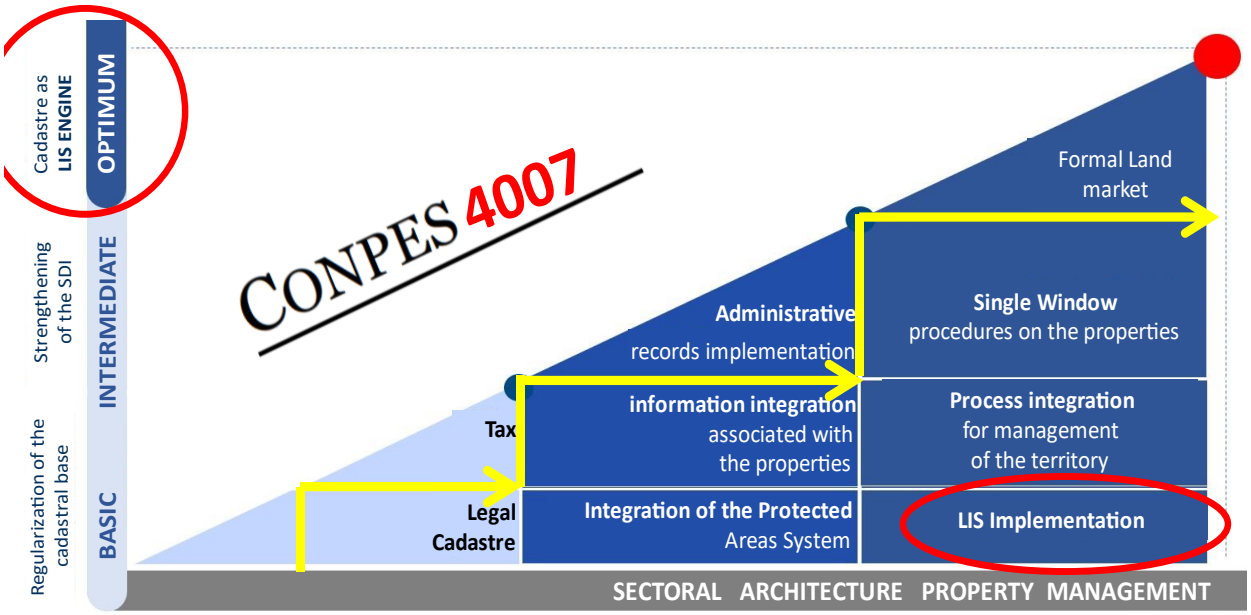
Regarding land administration, in 2019, the average number of years that the cadastre was outdated was estimated at 12.2 years; less than 6% of land is updated, and more than 28% does not have cadastral information (collecting cadastral data). Consequently, processes derived from cadastral information—including land use plans, urban planning, and access to land titles—are lagging behind. Due to inefficiencies, these processes are affected by the bureaucratization of procedures, corruption, and other land-related social conflicts.

The importance of this issue is highlighted by the fact that the government's 2,016 peace agreements with the armed groups include short-term plans to update cadastral information throughout Colombia (IGAC, 2021). Therefore, beyond the global trend of needing to modernize, the issue of land management in Colombia through a modern cadastre, becomes a social urgency to preserve peace and save lives.

As reflected in the figure 3, in this post-peace agreement period, Colombia is designing policies to modernize land administration, which will gradually include the following scopes:

- Updates to cadastre, with basic legal and fiscal integration with the land registry,
- Spatial data infrastructure modernization in the medium term, with coordination between the various registries related to land rights, restrictions, and responsibilities,
- Streamlining of land-related processes and procedures, focused on windows for comprehensive citizen services,
- The Land Administration System as an optimal vision focused on improving decision-making and making the land market more efficient,
- Overarching adoption of international good practices and standards such as the *Land Administration Domain Model (LADM)* for both property objects and legal land objects. (Steudler, 2014).

Figure 3. Diagram of Gradual Modernization of Land Administration in Colombia



Source: National Planning Department of Colombia

In Colombia, one of the main conceptual challenges has been implementing a Land Administration System (LAS), which has required a review of paradigms and international references that could be aligned with Colombia's expectations for processes related to land, surface rights, and territory.

2. LAND – TERRITORY – THE PARADIGM OF LAND ADMINISTRATION IN COLOMBIA

In 2007, Williamson and Wallace published a document called "*Land Administration System for Sustainable Development.*" See figure 4.

2.1 Williamson's LAS Model

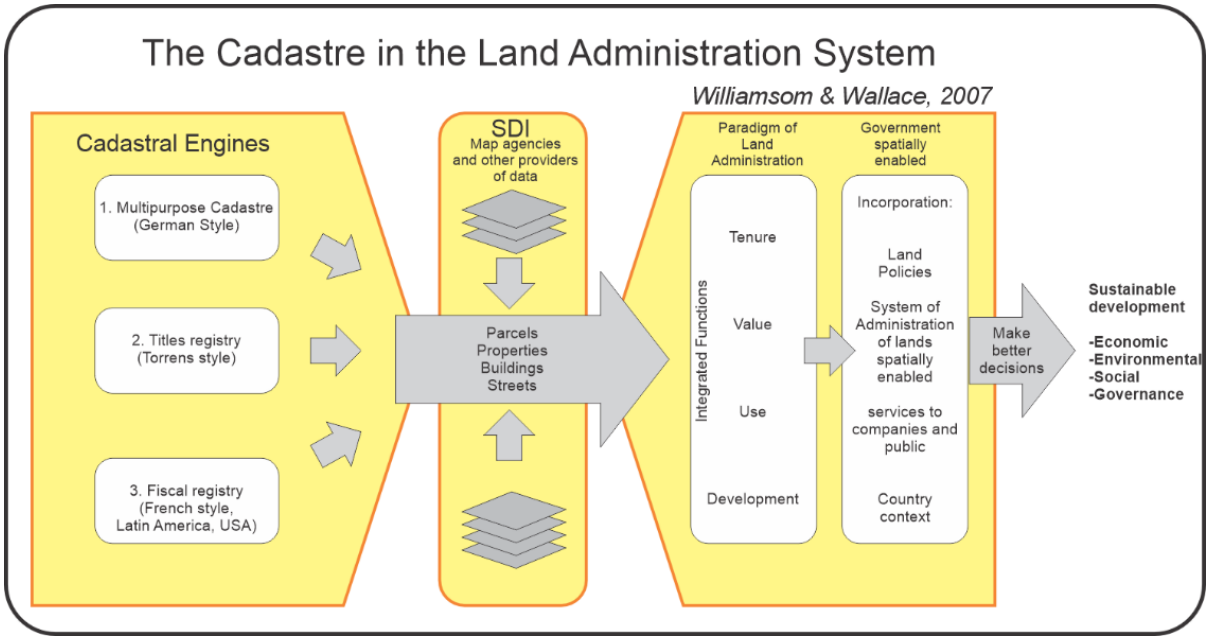
Figure 4. Williamson Publication (Willamson, 2010)

Source: ESRI Press

This model (figure 5) shows a simplified version of a systemic vision with the following premises:

1. The cadastre is not an end, but rather an engine for information, whether its priority is multipurpose (like the German style), tenure (like the Torrens style), or fiscal (like the French, American, and Latin American styles).
2. This information must be part of a spatial data infrastructure (SDI), where data about property characteristics as well as geospatial information from other provider agencies converge.
3. This organized, standardized, and available information must be integrated into the system's functions, which in this model include tenure, value, use, and development—the areas where information is used, processed, and constantly updated.
4. The purpose of these functions is to help country become a spatially organized state where land policies align with the system's purpose, with the integrated services offered or required by the private sector, and above all where policies are continuously being adapted to the national context.
5. Finally, all the different parts must result in better planning and implementation decisions regarding economic, environmental, and social development, as well as governance.

Figure 5. Land Administration System – Williamson



Source: Adapted by SwissTierras

Given Colombia's conditions, problems, and urgency to improve, its challenge is how to approach a transformation that is sustainable over time and that can also result in rapid solutions for urgent conditions — which is why land administration was included as one of the peace agreements. Although taking time to conceptualize can be beneficial, policies could stagnate in the proposal phase, lack continuity, and even affect the immediate results that were a product of social pressure. Additionally, the real problem is not solved if only the immediate problems are addressed without a vision for transformation in the medium term. Therefore, the methodology needed to address these issues becomes much more important in this context than for countries with adequate land management and fewer social crises caused by unequal access to land.

Despite the fact that Colombia's Land Administration System (LAS) is a work in progress, it represents an interesting example for Latin American countries as well as for developed countries that tend to be cooperating partners that promote development.

2.2 Overall Vision of the System

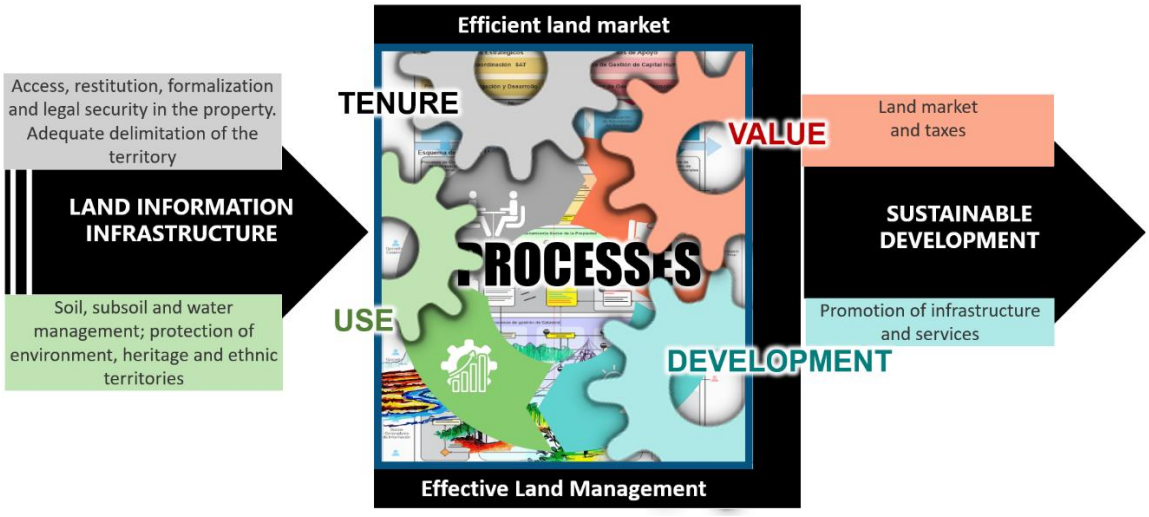
To push for comprehensive transformation, high-level discussions were held in order to agree upon a joint vision. The first priority was the five-year development plan, immediately following the peace agreements, thus making it easier to align institutional, economic, and international cooperation priorities in this matter. This was followed by the conceptualization

of the Land Administration System (LAS), not seen as software or a geographic information system but rather as an institutional infrastructure for the integration of processes, regulations, data, and stakeholders involved in the value chains for information management as well as operations and decision-making defining rights, restrictions and responsibilities.

Initially, it was established that the LAS does not represent a new system, but rather the existing one made up of the regulations, processes, and stakeholders implementing the current processes. However, this current system does not operate efficiently; therefore, it needs to be restructured and optimized.

Overall, the LAS focused on two major goals to improve effectiveness: the efficient land market and effective land management.

Figure 6. General Framework of Colombia's Land Administration System (LAS)



Source: Prepared by SwissTierras

2.3 Breakdown of Macro-Processes

This systemic vision was subdivided into four large macro-processes aligned with the four functions: value, tenure, use, and development. In accordance with the methodology for adopting public policy, this vision was turned into a proposal by the National Council for Economic and Social Policy (CONPES) - an entity that facilitates the methodological implementation of development plan decisions that require the coordination of various institutions for a joint project. In this case, the institutions dealt with land management and its modernization, with the support of some cooperating entities, including the Swiss Secretariat for Economic Affairs (SECO), through the SwissTierras Colombia project. The document

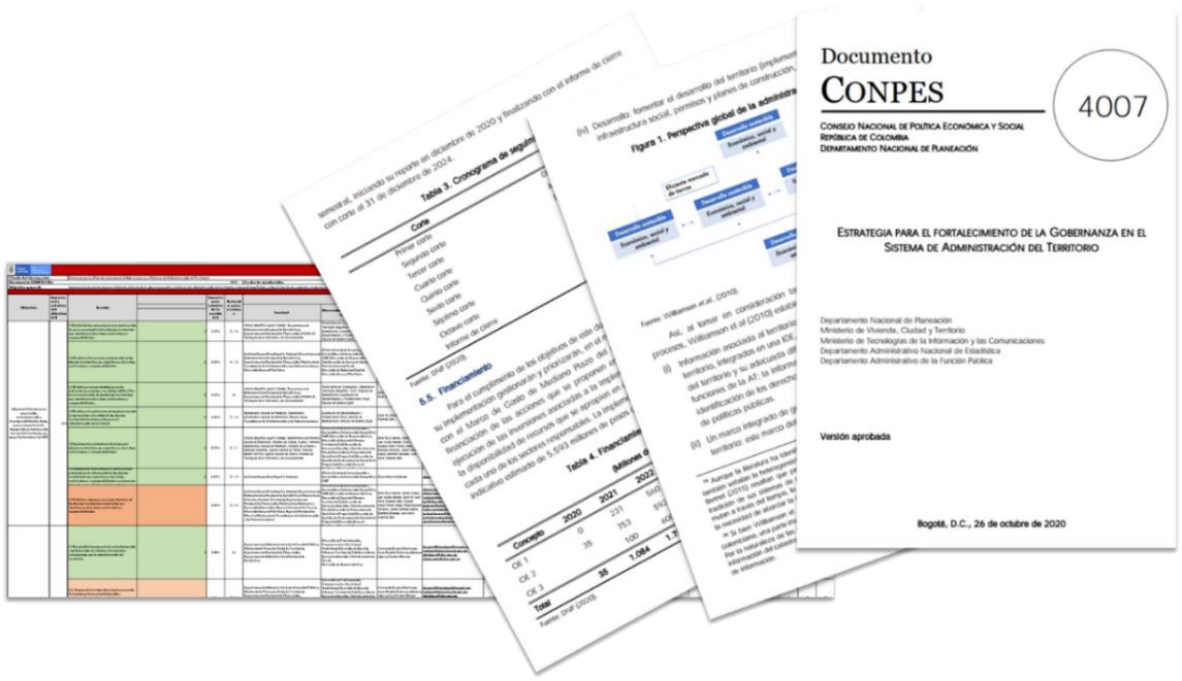
approved in October 2020 was called CONPES 4007 (DNP, 2020), Strategy for strengthening governance in the Land Administration System.

The four major macro-processes and their alignment with the transformation objectives were grouped as follows:

- Land information management,
- Internal coordination for data interoperability,
- Decision-making related to land,
- Demand, including citizen services.

In accordance with the CONPES methodology, this led to a roadmap called the Public Policy Action and Follow-up Plan. This includes specific goals for each institution, indicators, and periodic monitoring mechanisms.

Figure 7. CONPES - Colombian public policy methodology for inter-institutional coordination



Source: Planning National Department of Colombia

2.4 Process Improvement and Procedure Streamlining

Each institution assumed responsibilities as they were approved; however, it is worth highlighting an example of inter-institutional cooperation regarding how change management was managed while creating the LAS. It was led by the Administrative Department of Public Service and the National Planning Department, which coordinated with other institutions to

determine land management procedures. Of more than 600 procedures, approximately 70 procedures directly associated with land management were identified, which are part of 27 processes related to the system's current operation.

This diagnostic established the As-Is state of the Land Administration System's operating model, to be used as a starting point to develop the To-Be version, which will include more efficient processes and procedures with better intermediation and interoperability.

The advantage of a vision focused on processes is that it avoids concentrating efforts only to improve the mechanism, thus ensuring that the technology is responding to the need for process improvement, rather than merely digitizing the current procedure.

The findings at this stage showed the complex processes that citizens faced when carrying out their procedures and the historical lack of coordination between institutions working towards efficient public service. However, it is necessary to find evidence in order to propose plans for gradual transformation that include inspection, oversight, and monitoring. Regarding monitoring, there is a glaring need for LAS to have a formal institutional framework; although an initial premise exists, needs to be formalized for its overall improvement.

2.5 Focus on the Citizen

This was an overarching theme to serve as a reminder of the purpose: to improve public services, and improve the processes of participation and transparency in the administration of the territory.

3. THE COLOMBIAN LAS MODEL

When Colombia's current Land Administration System (see figure 8) is broken down, it becomes clear that is based on Williamson's model, although expanded in greater detail, and the following components can be identified.

3.1 Seven Components

Component 1. Information Capture Processes

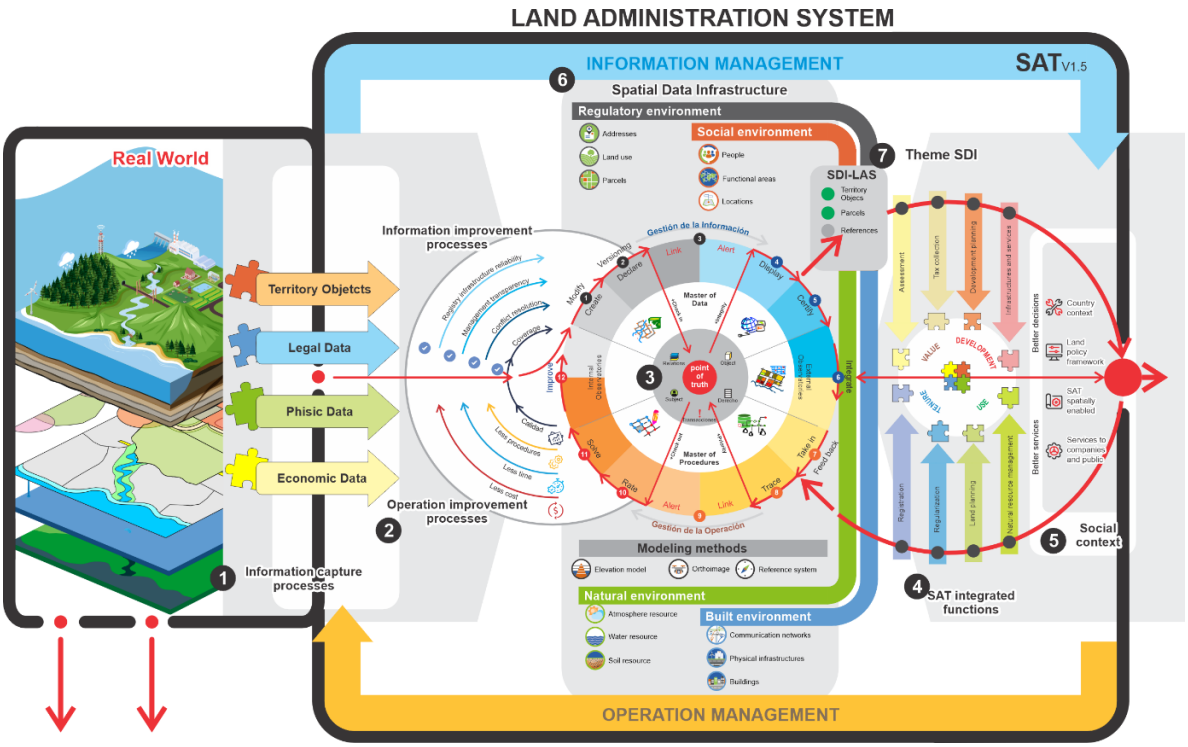
In Colombia, there has been an effort to standardize property information and connect it to registry information, thus adopting a model dived architecture (MDA). This standardization includes property objects and legal land objects, constituting public law.

The challenges of this information gathering process include simplifying instruments and participatory methodologies, as well as accepting that both formally registered information and data about informality must be collected in order for the institutions to implement their formalization policies.

Component 2. Operation Improvement Processes

This defines the operation model (As-Is / To-Be) that aims to optimize the system, focused mainly on reducing time, intermediation, and costs, while increasing quality indicators such as coverage, updating, inclusion of informality, inspection, oversight, and monitoring of the decentralized cadastral management operation.

Figure 8. Land Administration System (LAS), according to the Williamson model



Source: Prepared by SwissTierras

Component 3. Single Source of Truth

This has been called a master data repository and is a feature of the National Cadastral Information System (SINIC, as per its acronym in Spanish) (IGAC, 2020). Although it is still being developed, it will serve as a mechanism for the authentication and interoperability of official information.

In the best-case scenario, the decentralization of cadastral managers into regions will make services more accessible for citizens, increasing the availability of national

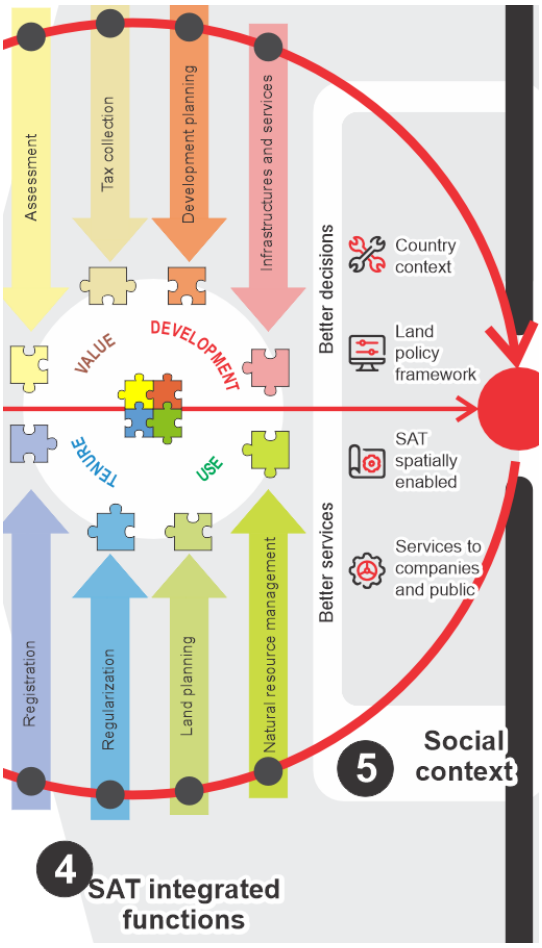
information for all the users who take part in the implementation. This information from the single source of truth database includes the list of rights, restrictions, and responsibilities related to public law land objects and property alerts about ongoing procedures.

Component 4. LAS Integrated Functions

These have been detailed in the CONPES 4007 policy and define the institutional scope for information management, interoperability, citizen services, and decision-making regarding land. These functions cover the two current paradigms in public policy in Colombia - the Multipurpose Cadastre and Land Administration - in a combination that coordinates the large processes where citizen and intermediation stakeholders are involved. The following are examples:

- Value function: Assessment and tax collection processes,
- Tenure function: registration and formalization processes,
- Use function: land use planning processes and natural resource management,
- Development function: planning processes for development, infrastructure, and services.

Figure 9. SAT functions – A closer look at part of Figure10



Component 5. Social Context

These areas form the development policy targets, and they define how the information provided by LAS can impact decisions. For example, the agrarian reform policy and land use planning around water are action areas that have continued through the 2022 government administration change, placing the LAS as a priority in the new development plan, which will govern actions for the next four years. (DNP, 2023).

One distinctive feature of the LAS functions is that the idea of aligning decision-making regarding land is considered; beyond the LAS stating things as facts in a vertical sense, it is also part of the conflict resolution exercise according to

the land use planning model in Latin America, which differs from the dynamics in European countries. In a sense, this gives it an added dimension beyond land and more towards territory.

Component 6. Spatial Data Infrastructure

Based on the Integrated Geospatial Information Framework methodology - IGIF (UN-GGIM, 2020), this modernization includes making information produced by several different institutions more readily available, as well as the governance of the different data models for both property and land objects that constitute public law through rights, restrictions, and responsibilities.

Component 7. Land Administration SDI

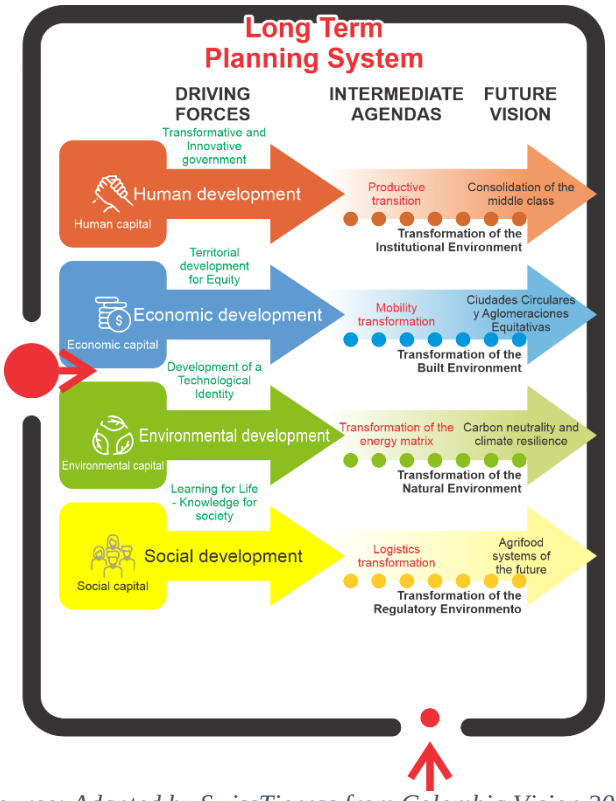
This element has yet to be ideally conceptualized since the SDI concept for land administration (IDE-AT, as per its acronym in Spanish) (ICDE, 2017) still requires greater coordination within ongoing change management processes. However, there is a gradual, yet significant coordination of efforts aimed at observatories, such as the National Real Estate Observatory and Observatory on Land Use Planning (IGAC, 2023), which are relevant tools which concentrate citizen information services.

Although the framework could be considered like the Land Administration System, the inclusion of decision-making processes around land and the overall improvement approach gives it additional value. Land and territory do not mean the same thing, at least in terms of Colombia's LAS.

3.2 Towards a Systemic Vision for Development

One of the interesting aspects of the LAS model is its orientation towards a systemic vision made up of the various environments that produce the information needed for the same purpose: sustainable development or

Figure 10. Long Term Planning System



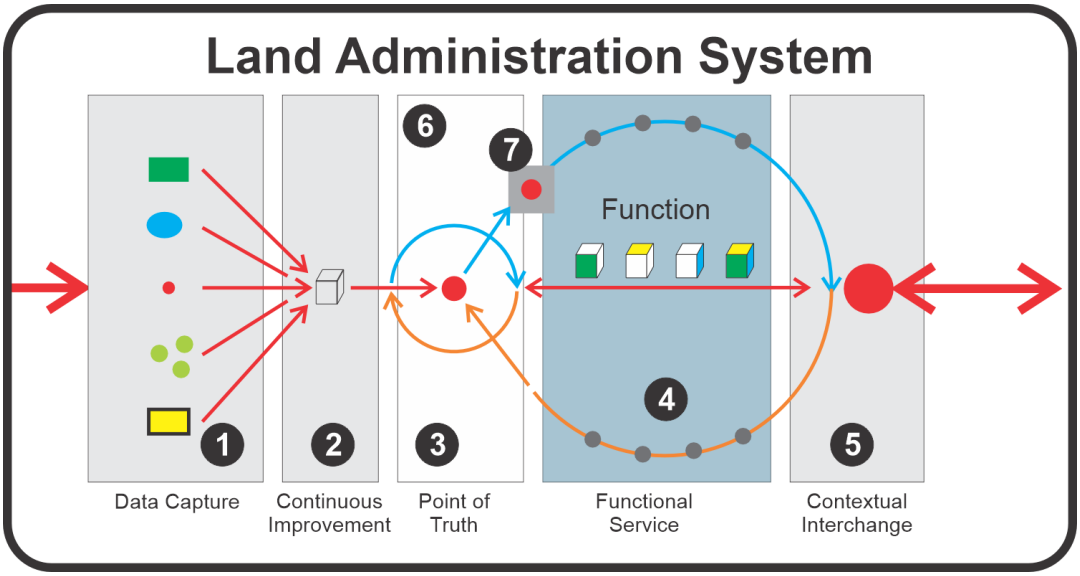
Source: Adapted by SwissTierras from Colombia Vision 2050 (DNP, 2022)

long-term planning system (See figure 10). Although the information produced by the LAS makes up a large amount of land-related data, there are other systems that work within its specialized information system, which is not always part of the spatial data infrastructure. The creation of the LAS will inevitably lead to the joint vision of interoperability concepts such as digital twins, currently trending in various industries. (Alvarez, 2020)

The following are examples of different systems which generate information and manage results for sustainable development planning, and which will inevitably need to be aligned as the state transforms itself into what it should have always been: a place with authentic records. (See figure 11). Many of them refer to the same land but with different visions depending on the thematic specialization, as reflected in the figure 12:

- Management systems for natural environment,
- Management systems for built environment,
- Management systems for economic environment,
- Management systems for social environment.

Figure 11 Digital Twin concept simplified from the Land Administration System

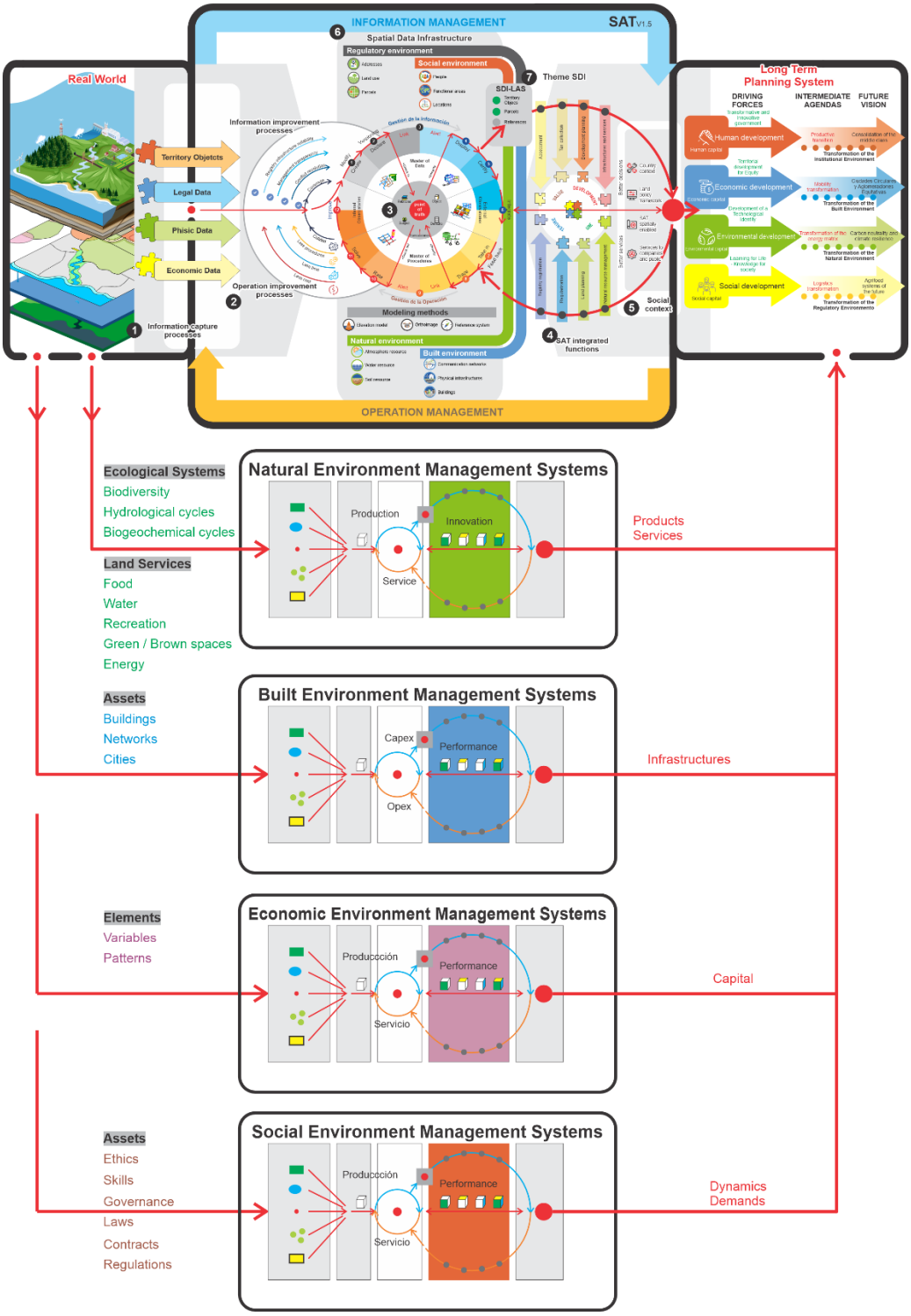


Source: Prepared by SwissTierras

The LAS is one of various systems that captures and processes information, performs functions, and provides information to be queried by other systems. The system itself must be characterized and monitored, and its ongoing improvement must be guaranteed.

In Colombia's new development plan, the LAS is highlighted as a high priority for implementation within sustainable development public policy. An added value of creating the LAS is that it will impact the alignment of the other systems.

Figure 12. Systemic Vision for Sustainable Development



Source: Prepared by SwissTierras

4. CONCLUSIONS AND FINDINGS REGARDING LAS ADOPTION IN COLOMBIA

- Colombia requires a governance of the territory administration that understands the economic, social, and environmental dynamics of a post-conflict society. For this, the different approaches and fronts that exist on land administration have been innovated and adapted through public policy. Especially adding the decision-making processes with the purpose of having a comprehensive vision of the relationships and conflicts between people and their territory to move towards a peaceful society.
- The existence of models such as the Williamson LAS are important as a starting point for countries that need support in adopting a model. Colombia's added value of building on what has already been created can enhance this knowledge for Latin American countries that usually see Colombia as a benchmark in terms of land-related issues.
- A systemic vision of land administration facilitates an organized implementation of changes using methodologies demonstrated by industrial engineering for professionals in planning, technology, or public service. These methodologies — such as the process approach, a focus on service, and gradual implementation scenarios — have proven to be functional in many currently successful industries in both the private and public sectors.
- Implementing changes can be successful over time if they are based on the dynamics of each country's public policy. Understanding their relationship means understanding some of the population's idiosyncrasies, including the class associated with academia, public service, and politics. In Colombia's case, linking the necessary transformation to social pacts (such as peace agreements), to medium-term planning (such as the development plan), and to intersectoral planning (such as CONPES), allows an initiative to be able to mature beyond one government administration. If it is supported by a clear social need, its continuation can vary slightly in terms of mechanisms, but not in terms of its focus on the future.
- Land management paradigms are variable and closely linked to industry revolutions or crises with global implications. The accelerated race for the fourth industrial revolution — almost directly proportionally aligning with the social and environmental crises — will require land administration systems to meet new demands, including reducing time, costs, and intermediation as well as greater transparency and quality assurance of registry infrastructures.
- A Land Administration System based on an integrated management vision makes it easier to align actions within the same roadmap. This is especially true if it is applied to international cooperation, which is currently a great contribution; however, the efficiency of international cooperation will be most beneficial if the country already has a comprehensive plan in place.

- The Colombian model has its complexities due to the country's dynamics around matters that could be simpler for others, but it's working.

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