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# **CURRENT STATUS AND PROSPECTS FOR NATIONAL SPATIAL DATA INFRASTRUCTURE OF CHILE**

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## **Abstract**

Geospatial Data Infrastructure of Chile (Chilean SDI) is a network of public institutions working in a coordinated and collaborative manner with the objective of making available to the whole community, current and reliable geospatial information that is useful for public and private administration, also addressing the needs of citizens.

This government initiative is led by the Ministry of National Property, whose higher authority plays the role of President of the Council of Ministers for Territorial Information. From this ministry guidelines are provided to members of the SDI actors, to optimize information management in their organizations, and to facilitate sharing and public access.

To advance the implementation of the Chilean SDI, the work of the Ministry along with all institutional actors that compose this network, both centrally and in regions, has focused on the traditional components of geospatial data infrastructures, which are addressed by all states that carry out this kind of initiative, among which can be mentioned legal framework, institutional organizing, technological tools, interoperability (standards and specifications) and capacity building.

This article describes the progress of the Chilean SDI, considering each SDI component mentioned above. It includes a chapter on international participation and then delivered the core elements that make the vision of what we intend to achieve in the future in the field of geospatial information management in the country.

## **I. Introduction: the value of geospatial information**

Geospatial information is defined as "any information that refers to a location on the territory." The use of this type of information contributes to decision-making in matter of public policy on a particular and very important: allows establishing "where" (where to invest, where to save, where to lift infrastructure, where subsidize).

Rapid advances in geospatial information and technologies have transformed into a valuable tool both in business planning and implementation, and in the elaboration of policies and research. Across all sectors of society have recognized that the effective use of this type of information helps in addressing the major issues of country, such as climate change, natural disasters, pandemics, environment, public safety and energy , among others.

To maximize the benefits from the use of geospatial information is required to work under the concept of a Spatial Data Infrastructure (SDI), so that it can be used by all actors that require it. In our country, the SDI is called “National System for Territorial Information Coordination (SNIT)”. This system - since it was established in 2006 has given the guidelines and coordinated the roles of various public stakeholders involved on geospatial information management.

## **II. Background in geospatial information management in Chile**

Efforts to improve the management of geospatial information in our country began in the mid-90s. This process recognizes four basic stages.

The first stage was between 1994 and 2000, in which the use of GIS was growing steadily within public bodies. For this reason it was possible to identify issues related to the management of geospatial information such as duplication, incompatibility of formats, mismatch between maps generated by different agencies, lack of installed capacities within the public sector, among others.

In a second stage, between 2000 and 2006, SNIT was born as a first SDI project; an incipient institutional coordination network was expanding continuously and generated the first legal instruments: two presidential instructions and draft document of policy for geospatial information management delivered guidelines that were finally reflected in the Supreme Decree No. 28, signed in March 2006.

Later, between 2006 and 2010, the major milestone was the formal creation of SNIT as Chilean SDI, in September 2006. Other important developments were related to the creation of technological tools (first viewer of geo-information national wide and catalogue), along with the definition of priorities for information and initial formal training activities.

Since 2010, we have worked intensively in the consolidation of SNIT as the Chilean SDI, strengthening the work from the institutional ambit of the SDI, also emphasizing the availability of information, in the adoption and implementation of norms and standards, and the development of activities for capacity building.

## **III. The Chilean SDI today**

The central objective of the Chilean SDI is making available to all citizens quality information, ensuring that it is generated once and exploited throughout the infrastructure. For this we have an extensive network of coordination of public institutions working collaboratively to improve the management of geospatial information, according to the guidelines delivered by the existing institutional framework.

The following describes the current state of the Chilean SDI in terms of a number of relevant components.

➤ **Legal Framework**

The legal framework for geospatial information management in Chile, in the scheme of geospatial data infrastructures, is given by Supreme Decree N ° 28 that creates the National System for Territorial Information Coordination, identified by the acronym "SNIT", as a permanent coordination mechanism for the management of public territorial information in the country, composed by State institutions generators and users of such information. Among the main functions of the System, the decree states:

- Permanently examine technical norms and standards that allow interoperability of territorial information.
- Study and propose norms, tools and actions to strengthen and promote the policy for territorial information management.
- Support the maintenance and management of the territorial information portal of the System.
- Assist in the promotion of the national community for territorial information.
- Collaborate in the presence and representation of the country in the international community of geospatial data, territorial information systems and all kind of instances related to the modern management of territorial information

This legal framework assigns to the Council of Ministers of Territorial Information (consisting of eleven secretaries of State) the higher coordination of SNIT and establishes an Executive Secretariat in the Ministry of National Property for the operational coordination of the various public bodies that make up the System. This Secretariat is headed by an official appointed by the Minister of National Property and is named Executive Secretary of the National System for Territorial Information Coordination.

Finally, note that each minister of the Council of Ministers for Territorial Information is represented in a Technical Committee of Inter-ministerial Coordination, whose function is to advise and assist the Executive Secretary regarding policies of territorial information management.

Despite the progress made up to date in matter of geospatial information management, some problems remain requiring a robust legal framework, stronger than the Supreme Decree currently in force. These

problems are related to the weakness in the mandate of the coordinating institution; the need to strengthen the role and responsibilities of the members of the Chilean SDI; information with quality, documentation and institutional support problems; lack of participation of institutions outside the Executive Power; costs for the acquisition of fundamental data and tasks that are not performed by not having these, among the most relevant. All these issues can be understood as aspects that can be improved through Law Project for the Chilean SDI, currently underway.

➤ **Organization of the institutional network for the collaborative work**

In order to strengthen the national SDI, execution of plans and policies implementation depend on the ability of institutions to communicate, create alliances, establish agreements and develop projects.

Currently, there are four instances for institutions to work together and to contribute to the objectives of the national SDI.

- Development of sectoral projects and programs related to the implementation of SDIs in public institutions, such as the ministries of Agriculture, Environment, Public Works, Housing and Urban Development; also undersecretaries of Telecommunications, Tourism, and the National Institute for Statistics. Other initiatives represent a sample of the growing list of projects that contribute to the development of the national SDI, such as the modernization of the national cadastre (Ministry of National Property), the implementation of a satellite image viewer (Aerophotogrammetric Service of the Air Force), basic mapping viewer (Military Geographic Institute) and the Integrated Emergency Information System (National Office for Emergency).
- Thematic areas: there are eight permanent thematic groups focused on managing information related to topics of national importance, such as Basic Information, Planning, Infrastructure, Natural Resources, Social, Housing, Patrimony and Environment.
- We also have established working groups to address specific issues. This requires joint efforts of several institutions, which have common challenges related to a particular problem. Unlike the Thematic Areas, that have a status of permanent and are incorporated into the legal framework of the NSDI, these groups are temporary and do not require a high level of institutional agreement.
- Finally, it is important to highlight the work of the regions of the country. In each, the goal is the implementation of a regional SDI to support decision-making and public policies according to their regional strategies.

➤ **Technological tools for accessing geospatial information**

In terms of technology, the work of the SDI is focused on the implementation of tools for accessing geospatial information, inspired in the concept of "a single place to access," and the innovation and development of new technologies that provide capabilities for different institutions in the country to publish and share information.

Today, the Chilean SDI has a National Geoportal that plays the role of a single window of access to information provided by different agencies through the publishing capabilities of their own institutional portals. This means that the information displayed on this geoportal resides and is updated by each generating organisms, thus avoiding the problems of duplicity.

This information is aimed at citizens (for example, to know the urban master plan, tsunami zones, location of schools and health centers, learn from the environment, etc.); at companies (for example, to support location decisions of large-scale projects, real estate, economic and touristic development); at public bodies (for example, providing information for the generation of public policies, targeting resources, location of projects, evaluation, emergency response, etc.).

From a technological point of view, the work of SNIT Executive Secretariat aims at the maintenance and continuous optimization of the platforms on which this geoportal and its viewer work, always with the objective of improving the user experience and satisfying the objectives of those who use this tool.

Another important aspect corresponds to the functions of catalog or data discovery portal and information of the National Geoportal, since it is possible to find not only digital maps published on the Web, but also other formats that contain geospatial information such as studies, reports, statistical tables, charts, etc.

In terms of sectors, regions and some municipalities, significant progress in the field of geospatial information portals has been registered. Several institutions today have implemented a solution to deploy their information to the public and are approaching the consolidation of a spatial data infrastructure. Table N ° 1 provides some examples:

Organization	Territorial Level
Ministry of Environment	National
Ministry of Public Works	National
Ministry of Agriculture	National
Ministry of National	National
Ministry of Mining	National

Ministry of Energy	National
Military Geographic Institute	National
Aero-Photogrammetric Service	National
Regional Government of Antofagasta	Subnational
Regional Government of Coquimbo	Subnational
Metropolitan Regional Government	Subnational
Regional Government of Los Ríos	Subnational
Regional Government of Magallanes	Subnational
Municipality of Maipú	Local
Municipality of Las Condes	Local
Municipality of San Antonio	Local
Library of National Congress	National

Table N°1 Institutions with SDI initiatives and geoportals

➤ **Interoperability, standards and specifications**

This corresponds to a key chapter in the development of the SDI because it provides a framework in norms, standards and technical specifications for activities related to production, management and use of geospatial information.

In this this matter the following lines are developed:

Development and maintenance of Chilean norms: this is a permanent line aimed at generating Chilean norms of geographic information from ISO international standards produced by Technical Committee TC 211 of this organization. This task is coordinated by the Ministry of National Property, through SNIT Executive Secretariat and conducted by the National Institute for Normalization (INN). In the process of elaborating Chilean norms several public agencies participate, including major national mapping agencies like the Military Geographic Institute (IGM), Hydrographical and Oceanographic Service of the Chilean Navy (SHOA) Aero-Photogrammetric Service of the Chilean Air Force (SAF), the Information Center on Natural Resources (CIREN), and other public bodies such as the Ministry of Public Works (MOP), and the National Service of Geology and Mining (SERNAGEOMIN).

Elaboration of technical documents: we develop manuals and recommendations to facilitate the implementation of norms, standards and specifications in the context of the work of public institutions with geospatial information

Dissemination and training activities: we realize workshops at central level and in the regions of the country, focused on the dissemination of theoretical and practical concepts of geographic information norms and their role in spatial data infrastructures.

Participation in international organizations: our country is involved in the process of developing international standards of geographic information, lead by the Technical Committee ISO TC 211, through the establishment of a working group or "mirror committee" that calls for public, private and academics organizations, to comment about the standards developed by ISO TC 211. Similarly, the Chilean SDI through its Executive Secretariat is an observer member of the Open Geospatial Consortium (OGC), international standardization instance where participate national governments, major companies and academic institutions worldwide with the aim of establishing geographic information standards.

#### ➤ **Capacity Building**

This is an activity that has carried out steadily over recent years, but has not been systematically addressed as a task of the national SDI. Training activities are performed according to an annual plan of the Executive Secretariat and also according to the demand expressed by the members of the SDI. Every year we train more than 500 people from the central level and regions in matters of free and proprietary software, Chilean norms on geospatial information, information management and technology, among others.

#### ➤ **International activities of the Chilean SDI**

The integration and interaction of the Chilean SDI in the international community is addressed on three levels: global participation, regional cooperation and bilateral relationships.

In the global context, our country has an active participation in the initiative "Global Geospatial Information Management (GGIM)", led by the United Nations organization, which is materialized in the operation of a committee of experts on Global Geospatial Information Management (EC-GGIM) conformed to play a leadership role in the overall management of geospatial information and promote its development towards global challenges and provide mechanisms for coordination between member states, international organizations and permanent SDI committees at regional level, in order to work in partnership in the overall management of geospatial information.

The committee of experts reports to the Economic and Social Council of the United Nations (ECOSOC), which is the central agency, intergovernmental, which formulates policy recommendations addressed to member states on these matters. Since its formal establishment in the city of Seoul, South Korea on October 27, 2011, the Executive Secretary of SNIT is formally involved in the EC-GGIM, representing the country.

At the regional level, the Chilean SDI is part of the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA), a regional body composed by those organizations leading the national SDIs. In the Chilean case, the representative in CP-IDEA is the Executive Secretary of SNIT initiative.

PC-IDEA has a Directive Board, which is composed of a President, a Vice President, an Executive Secretary and four vocals. The vocals should be representative of the four American sub-regions; this is North America, Central America, Caribbean islands and South America. Our country, in the person of SNIT Executive Secretary, played the roles of PC-IDEA vice president and vocal for South America between 2009 and 2013.

PC-IDEA developed a work plan 2012-2013, ongoing, whose development and monitoring is in charge of the Working Group on Planning (GTplan), integrated by Mexico, Brazil, Colombia, Canada and Chile, under the coordination of Chile and co-led by Canada, focused on the areas of capacity building, best practices, standards, and institutional issues. This working group was created to address the recommendations of the Ninth Regional Cartographic Conference of the United Nations for the Americas, oriented to support the establishment of SDIs in the region.

Finally, the Ministry of National Property maintains formal bilateral cooperation with the Republic of Korea through a Memorandum of Understanding (MOU) with the Ministry of Land, Infrastructure and Transport of that country, in the field of land management, geomatics and cadastre. The areas of potential cooperation between the two ministries include land management and management of coastal areas; geospatial information and development of spatial data infrastructure; integration and dissemination of spatial data; cadastre and real estate management, and other areas of mutual interest to be decided by both countries.

In the framework of this MOU some activities have been materialized both in Chile and Republic of Korea, aimed at exchanging knowledge and experiences, capacity building, with a view to support the process of Chilean SDI implementation.

#### **IV. Looking towards the future**

Reviewing the progress of the Chilean SDI described in the preceding chapter, it is possible to appreciate that the realized work has attempted to address the traditional components of geospatial data infrastructures nationwide, up to date with a strong emphasis on management issues of public agencies. To achieve this, the Executive Secretariat of the Chilean SDI has maintained a close collaboration relationship with the ministries and their related organizations, national mapping agencies and regional governments, with a view to support the management of geospatial information from an institutional and technical point of view.

Nevertheless, the road ahead is quite extensive and challenging, especially when considering the experience of developed countries in these areas, in which the number and variety of existing applications, the scale of detail of the basic information, the use of real-time information, the use of transactional sites, the participation of private sector, municipalities and academia, and the existence of open geospatial data policies, make a difference and are presented as strategic issues necessary to address in order to advance towards higher levels of maturity for our national SDI. Several of these issues are currently being addressed, however its development should be seen in a context of long-term, based on scalable planning, permitting move forward step by step. To do this, it is essential to set the vision, objectives and action guidelines on a document used as a road map for the operation of the Chilean SDI in the coming years.

An important component of this vision is the citizenship as the final addressee and beneficiary of a geospatial information management. The efforts of the SDI should focus, first, to increase the number and diversity of geospatial information services to solve the needs of people in matters of location concerning various areas: health, education, public utilities, sport and recreation, among others. Also, understanding that citizenship obtains benefits from public policies and the management of State administration bodies, geospatial information that supports these decisions and policies also generates an impact on the welfare of people, although it is not easy to quantify its magnitude. Therefore, the challenges for the SDI in this area are on the way to encourage the use of applications to add value to the information and produce new knowledge, to support the mentioned decisions and policies.

In order to strengthen the SDI and move expeditiously towards meeting the objectives, it is necessary to have a robust legal framework that ensures the commitment and active participation of all stakeholders in the SDI. Many strategic issues raised previously (private and municipal participation, open data, detailed basic information, etc.) require to be supported by an Act, whose application entails a benefit to the

community as a whole, either to optimize the public sector labor, increase returns in the private sector or improve the quality of life of citizens.

Finally, note that the vision of the Chilean SDI considers the open participation of multiple stakeholders, the massive use of information by citizens, the integration of territorial scales with a strong emphasis on the local, and a growing generation of knowledge and geospatial awareness, among the most important aspects. This requires continuing the collaborative and integrated work that has given force to this initiative, to progress on institutional strengthening, assimilate and incorporate the advances of technology, continuously improving public information and promote the development of capabilities to maximize the benefit of this important resource for the development and welfare of the country.