

The Digital Transformation of Latin American Tax Administrations

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Development Sector

The Case of Chile

Fiscal Management Division

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THE DIGITAL TRANSFORMATION OF LATIN AMERICAN TAX ADMINISTRATIONS

Chile

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Contents

Abstract	v
Executive Summary	vii
The Environment of Transformation	vii
Resources for Digital Transformation	viii
Data in Electronic Media.....	viii
Services in Digital Channels.....	ix
The Digital Maturity of the SII.....	ix
1 Introduction to the Digital Maturity Index.....	1
1.1. Context.....	1
1.2. Digital Transformation Enablers	2
1.3. Key Areas of Digital Transformation	3
1.4. Digital Maturity Index Criteria Matrix.....	3
2 The Case of Chile	7
2.1. Digital Ecosystem	7
2.2. Resources for DT	11
2.3. Data (inputs).....	28
2.5. Products and Services (outputs)	36
3 Conclusions	47
3.1. Digital Maturity Index: Summary of Results.....	47
3.2. Lessons Learned	47
References.....	55
Annex 1 Matrix of Evaluation Criteria	57
Annex 2 Catalogue of SII services, December 2020	61

Abstract

The exponential growth in the capacity to transmit, store, and process large quantities of data through information and communication technologies is transforming the way in which tax administrations carry out their functions. The tax administrations of Latin American and Caribbean countries are currently making significant efforts to exploit digital technology so as to provide better services, eliminate gaps in compliance and become more efficient. This paper presents a methodology for identifying the gaps between the current state of the region's tax administrations and the digital model that has been evolving in international forums based on successful experiences with a specific focus on Chile. The analytical dimensions considered are

the country's prevailing digital ecosystem, the capacities available to the tax authority, the processes for obtaining data from taxpayers and, finally, outputs in the form of the digital services that these organizations provide. In Chile's favorable digital ecosystem, the Internal Revenue Service, a pioneer in the implementation of electronic invoicing and pre-filled tax returns, has made significant progress, although there is still room for improvement when it comes to data governance.

JEL codes: H11, H26, H57, O33, O38

Key words: digital transformation, information technology, data, fiscal control, services for taxpayers, tax collection efficiency, tax administration

Executive Summary

In Chile, the organization responsible for tax administration, the Internal Revenue Service (Servicio de Impuestos Internos, or SII), has made significant efforts to improve how it collects, processes, and stores taxpayer information for taxation purposes. The digital transformation (DT) of the SII has advanced consistently in recent years, making it one of the most advanced tax administrations (TAs) in the Latin American and Caribbean (LAC) DT process. Its existing digital culture is equipped to tackle the challenges posed by the use of IT to improve the organization's effectiveness.

With the vision that technology facilitates tax compliance, SII management and the information technology (IT) division seek to enhance the proportionality of its tax compliance strategy. In this context, this paper evaluates the progress of SII in its goal to offer services to taxpayers through digital channels, improve proportionality in tax compliance through big data exploitation, and manage the organization on the basis of data, within the framework of a conceptual TA digital maturity model.

This evaluation is made based on a digital maturity model composed of a series of criteria in matrix format whose objective is to analyze four key pillars in the digital development of any tax authority. The first pillar is the national ecosystem in which this transformation takes place; the sec-

ond pillar includes the human, technological and financial resources available to the SII to automate its information processes; the third concentrates on exploiting the use of technology to gather, analyze and process data and, finally, the fourth pillar centers on the generation of information services and products in TA business processes.

The paper concludes with the lessons learned from the Chilean case applicable to other countries currently in earlier stages of their digital development and some recommendations are put forward to close persistent gaps in the SII with regard to the best practices identified at the global level.

The Environment of Transformation

The digital ecosystem in Chile, in which the digital transformation of its tax authority is taking place, has been favored by two key factors: first, there is practically universal access to Internet in the country (95 percent of families have access to this service) and, second, the government has made the digitalization of government procedures a state policy. Chile currently occupies 22nd place in the Global Open Data Index (GODI),¹ making

¹The Open Knowledge Foundation's GODI can be found at: <https://index.okfn.org/place/>.

it one of the most advanced countries in the region in terms of digital government, along with Argentina, Brazil, Colombia and Mexico.

Moreover, Chile's advanced electronic signature system helps to ensure the reliability of the digital relationship between government and citizens, as well as between the SII and taxpayers. Digital identity, while still not enshrined in law, is confirmed by verifying a citizen's identity through the Chile's Civil Registration and Identification Service (Servicio de Registro Civil e Identificación), which authorizes issue of the unique password (*clave única*).

Resources for Digital Transformation

The SII manages its human resources within the framework of the Chilean public administration, subject to both general and country-specific regulations and boasting generally well-structured and advanced processes and systems. In terms of human resources, the staff administration system permits the organization to attract and retain civil servants and employees with the profiles and skills that are suited to institutional needs. Moreover, the practices of teamwork, capacity-building, and change management, as well as annual performance agreements linked to salary increases and performance evaluations, help strengthen the SII's human capital base.

In terms of technology, the SII is in the process of migrating, in qualitative terms, from investing in its own infrastructure—which has limited scalability, rapid obsolescence, institutional risks, and uses its own resources—to a more effective strategy. The new approach is complemented by the outsourcing of services, on-demand scalability, cloud-based services and big data, as well as sharing risks with suppliers and the shift from self-financing to operational continuity.

In recent years, this shift has been reflected mainly in a greater allocation of resources to operating costs in relation to capital costs. Between 2015 and 2018, 48 percent of the resources allocated to technology went to services, while 28 percent went to software and 24 percent to hardware.

One element that stands out from the SII experience is the coherence between digitalization policies, modernization of the State and the current procurement regulations applicable to the Chilean public sector, which is made up of 850 agencies that spend a combined total of US\$13 billion on procurement. These purchases are made through the transactional platform ChileCompra,² which helps to match the demand of public procurement agencies to offers by suppliers.

The direct results of the updated digitalization strategies suggest that the implementation of information system development plans and investments made in the SDI have been highly productive. Moreover, the Information and Communications Technologies Strategic Program (PETIC) (Programa Estratégico de Tecnologías de la Información y Comunicaciones) has assisted the SDI team in developing a long-term management and technological vision, incorporating the main trends and applying them to achieve the strategic goals.

Data in Electronic Media

In 2003, Chile became the first LAC country to grant legal validity to the electronic invoice. Now, the majority of other countries in the region are introducing the electronic invoice model, with varying degrees of penetration. In Chile's case, it is mandatory for all taxpayers.

Article 54 of Chile's sales and services tax law (Ley de Impuesto a las Ventas y Servicios) establishes that invoices, purchase invoices, invoice settlements, and debit and credit notes issued by taxpayers must consist exclusively of electronic documents issued in accordance with the law, apart from any pertinent legal exceptions. Chile has issued bills of lading electronically since January 17, 2020 and bills of sale and services since January 1, 2021.

Chile also presents one of the most representative features of an advanced digitalized tax

²More information available at: <https://www.mercadopublico.co.cl/Home>.

authority: access to online preliminary tax returns with pre-filled information taken from the SII databases, which taxpayers can modify or complement. Each form has different validations, applied online while the tax return is being completed, which can be format, inline, or verification of the information held in the databases.

The operation of the electronic invoice system is one of SII's most current and ambitious project for obtaining more timely and granular data. In this case, the purchase operations of natural persons are also immediately registered in the SII databases, meaning that the SII can advance toward its goal of receiving all transactional data entirely through digital channels.

Services in Digital Channels

Over time, SII has developed a culture of service for taxpayers, and its substantial improvements have been met with high appreciation by taxpayers and the public based on independent surveys. In recent years, the SII has achieved an integrated approach that includes process improvement, across-the-board risk management, implementation of the Taxpayer Attention and Assistance Model (MAAC) (Modelo de Atención y Asistencia al Contribuyente), and institution building for taxpayer experience management. The challenges it faces in this area include fully applying this approach to all processes in which it interacts with citizens, adapting to and anticipating new circumstances and demands, and constantly making technological innovations to maintain its reputation at the technological forefront in the country.

This new relationship with taxpayers has enabled a shift from mainly in-person procedures in SII offices to having a high proportion of online service users attended to by the MAAC. This relationship is now characterized by online help applications, registered taxpayer email addresses

for electronic notifications, the use of pre-filled tax returns, and high levels of acceptance of the value added tax (VAT) monthly tax return (Propuesta de Declaración Mensual).

With regard to the daily influence on taxpayers' lives, visits to the SII website, for example, rose from 776 million in 2009 to 2,288 million in 2019, while online business start-up procedures currently represent 99.8 percent of the total. Information portals offering electronic invoicing and tax reform have evolved into service portals with segmented messages and personalized email notifications.

In terms of including proportionality in its tax compliance strategy, the SII approach has shifted from applying risk management to tax inspection activities and using technology to detect and sanction misdemeanors, to a sophisticated, preventive approach that has meant building a tax ecosystem based on global connectivity, digitization, collaboration and information management.

The portfolio of monitoring actions now includes applying algorithms as soon as tax returns are filed, advanced big data and analytical tools for cross-checking and analysis to enable differential treatment of taxpayers according to their tax behavior, as well as a traceability application that helps to reduce illicit trade and tax evasion.

The Digital Maturity of the SII

According to the evaluation criteria used in the Digital Maturity Index, in the case of the Chilean SII, an advanced level is noticeable in both the digital ecosystem and the resources earmarked for DT, as well as in digital service provision and use of information for massive tax compliance measures. The processes to receive information can be improved by establishing an agency responsible for data policy and information security.

Introduction to the Digital Maturity Index

1

1.1. Context

Tax administrations are essentially transactional public organizations whose daily interactions with the majority of citizens provide substantial information about the economic operations taking place in their jurisdiction. This information is permanently stored by TAs to assess fiscal obligations and demand adequate compliance from all taxpayers.

Traditionally, the relationship between the TA and the citizen has been built on the principle of self-assessment, whereby citizens provide periodic data about their incomes and expenditures using forms pre-established by the administration and propose the amount of tax they are liable to pay. Thereafter, the TA verifies the veracity of the data provided by the citizen and arrives at a correct determination of the outstanding taxes, though control processes that include only a limited sample of the data received, given the practical impossibility of exploiting the entire universe of data on a continuous basis.

Tax inspections are applied to only a limited number of taxpayers selected through risk models that seek to maximize their impact. Under this tax administration paradigm, the flow of information goes from the taxpayer to the TA through periodic tax returns while, inversely, the citizen's tax affairs are scrutinized by the TA.

Naturally, the effectiveness of TAs to maximize tax collection, according to the prevailing fiscal policy, depends on the quality of the data they receive, and the information generated by its exploitation. TAs currently meet the challenge of receiving large quantities of data by processing them in real time to generate useful information that can provide better services and quickly eliminate gaps in taxpayer compliance. This explains why digital transformation (DT) is being adopted by TAs to make their data management more efficient and improve their performance. Through DT, the need for physical or paper-based processes in storing and processing data is eliminated, as they are replaced with electronic processes that can exploit data more fully, efficiently, and quickly.

DT is radically changing the internal TA operation by automating their operational processes while, at the same time, modifying the services they offer to citizens. The TA field is one in which the big data revolution has the greatest potential for government institutional capacity-building.

The main source of data obtained by the TA is no longer the periodic, signed personal tax return and has been substituted by microdata from every transaction reported either by citizens themselves through electronic invoices or else by third parties, such as financial institutions. Data are increasingly more precise and the information

TABLE 1**New Data-based Control Model**

	Traditional model	New digital data-based model
Pillar	Risk perception	Technology
Sources of information	Declarations and certifications	Electronic invoice in real time
Assessment of obligation	Self-assessment of declaration by taxpayer	The tax authority elaborates a declaration proposal
Control processes	Audits, trials, coercive debt collection	Invitation letters and cancellation of digital stamps
Risk management	Probabilistic models	Determinative tools

Source: Authors' elaboration.

that can be generated is increasingly more granular and received more promptly.

This information enables some TAs to prepare tax returns for citizens and offer them for review and acceptance. Tax inspections by these TAs are no longer selective and are becoming universal based on information from every transaction. The major source of secondary tax collection—that is, revenues from tax inspections—comes more and more from massive tax compliance control campaigns and less from individual inspections.

Improvements in technology have significantly reduced the costs of generating, transmitting, processing, and storing large quantities of information. Cloud technology and processing capacity means that TAs are able to receive information from practically all transactions that take place in the economy. As well as receiving data, the development of processing tools for analyzing large quantities of information has opened up the possibility for TAs to determine the amount of tax payable by citizens based on transactional information.

With this in mind, TAs around the world are now immersed in profound transformations that imply investments in new technological platforms, the design of data-based business processes, the adoption of new analytical tools, and changes in staff profiles and required skill sets. Underlying this process of transformation is the digital ecosystem in which companies and TAs find themselves. The Index includes analysis of the level of digital maturity based on a review of the current state of the components of the DT

process divided into (i) DT enablers and (ii) the key areas of DT.

1.2. Digital Transformation Enablers

Technological development is driving the DT of large organizations such as TAs in terms of computing capacity, communications, and information analysis. Cloud technology has boosted the capacity of organizations to receive, store, and process large quantities of information without having to make substantial investments in equipment.

Equally, tools for managing large quantities of data and algorithms for subsequent analysis make big data cross-checking possible and, therefore, universal controls can be applied in real time. Institutional capacities, however, have failed to grow at the same pace, resulting in bottlenecks in the digital transformation of some tax administrations.

The COVID-19 health emergency has had profound consequences in all scopes of human activity, such as in how people keep to themselves to avoid contact and break the chain of infections. This situation has obliged people, firms, and governments to place emphasize digital channels to maintain communication and collaboration. The isolation provoked by the COVID-19 emergency has given a definitive boost to the digital transformation of society and, consequently, of governments and TAs. This first section begins with an evaluation of the enablers of DT of the Chilean SII based on components of the Digital Maturity Index, which include the following:

- The **digital and institutional environment** in Chile, essential for understanding the impact this has had on the SII's digital development.
- The **resources and capacities** that the SII has allocated to its DT effort.

The DT efforts of the SII are conditioned by external factors, such as the country's national digital development policy, and by internal factors, such as the governance of information technology (IT), business processes, or the availability of human resources with technological skills that are different from the traditional profiles of auditors, access to financing and flexible and specialized procurement policies, in contrast to traditional public sector controls. This section also analyzes the institutional arrangements by which the SII governs the use of IT in digital media, as well as the level of functional integration of its systems and the technological platform with which business processes are electronically supported.

1.3. Key Areas of Digital Transformation

The Digital Maturity Index takes an information-processing approach to analyze the state of development in which TAs find themselves. This approach establishes as the key areas of DT, on the one hand, inputs to the process in the form of data received through digital channels and, on the other, the outputs of the same process in the form of information products and services required for successful tax collection.

As previously mentioned, TAs are organizations that depend on data to generate the information services required both by taxpayers, to comply with their tax obligations, and by TA employees, to carry out the business processes associated with tax collection.

In this context, digital transformation represents fundamental changes in the way that TAs function and are organized by having a direct effect on their central process, which is information gathering. DT implies new ways of receiving, storing, processing, and using data to generate

the data services and products that the TA offers. In light of the above, the maturity analysis focuses on the progress made by the TA in its process of gathering data digitally from its origin and the services that use these data, and which are similarly offered through digital channels.

The change that DT represents for tax administrations is equivalent to the impact it has had on the financial sector, where the way in which customers receive services from financial institutions has also been profoundly transformed. New actors have emerged, the financial technology service sector has seen exponential growth, and the value of the business has shifted from its network of branches to the design of its platforms. In this context, the DT of the SII is analyzed on the basis of these two components:

- **Data:** to discover the new forms it has established to interact with taxpayers in the process of collecting data through digital channels
- **Products and services:** with the aim of identifying the way the SII uses data to focus its control activities in order to obtain better results.

1.4. Digital Maturity Index Criteria Matrix

To establish analytical framework that can evaluate TA progress in its DT process, a criteria matrix was developed to model the level of maturity using a comparative approach. The matrix includes four specific components that form part of the enablers and key areas of DT: the **digital ecosystem, resources, data, and products and services**. The methodology considers that TAs are data-based organizations that generate information to enable citizens to comply easily with their obligations and, when they fail to do so, to identify and sanction them appropriately.

In this Index, DT is evaluated through a process-based approach—that is, paying special attention to the inputs and outputs, wherein the TA is the black box that transforms data into information useful for collecting taxes. The four

principles that guide the DT process and help to characterize the stages of progress for the purposes of the matrix are the following:

- The data enter the system only once (the “once-only” principle).
- The data are centrally managed for diverse products and services, with a single source of truth (SSOT) architecture.
- All data are transferred and stored digitally.
- Information is received and processed in real time.

Based on these principles, the index distinguishes four components and breaks each one down into sub-components for a more granular analysis. The following levels of maturity are established within each sub-component:

- Level I: incipient
- Level II: intermediate
- Level III: advanced
- Level IV: best practices

The components are grouped into those considered enablers of the DT process, such as the digital ecosystem of the country in which the TA operates and the resources available to the TA for incorporating technologies and implementing digital processes. The enablers are conditions that can drive or limit the speed and depth of the TA's digital transformation.

Furthermore, components related with the information processes are considered to be the key areas of DT that, under the process-based approach, are data collection and the generation of information products and services. The TA macro-business processes, such as providing services for taxpayers and both extensive and intensive oversight, are analyzed from a data and information approach. Annex 1 details the criteria that characterize the level of maturity for each sub-component presented below:

- Digital ecosystem. This sub-component analyzes the external conditions that a TA encounters in its DT process, such as the country's

digital policy, the degree of connectivity, the legal framework for digital identity and validity of electronic procedures, and the existence of leadership in the government's digital development. The parameters that determine whether an ecosystem is favorable for the digital transformation of a TA are the following:

- The country has a national digital policy, a digital government strategy and shared data policies.
- The percentage of the population with access to broadband Internet is higher than 70 percent.
- The digital government strategy is set out in a policy with a unit responsible for its planning, coordination, and evaluation.
- Digital identity is legally recognized and registration mechanisms exist to provide citizens with digital signatures that can be used for diverse procedures, including tax purposes.
- The TA takes the lead in developing digital platforms to offer services to citizens that go beyond fiscal procedures.
- Resources for DT. This dimension analyzes the enablers of DT, such as human resources, financing, and strategic planning, as well as the technological platform and architecture of the systems. For the purpose of this study, a TA is considered to have advanced significantly in its DT process if it meets the following conditions:
 - A strategic plan for technologies and information that has operational mechanisms for its governance and management.
 - Human resources management regulations and practices mean suitable staff can be recruited and retained in the numbers and quality sufficient for their functions.
 - The permanent staff to citizens ratio has reduced over the last 10 years.
 - The number of permanent staff working in IT functions has increased in recent years.
 - The leaving rate of permanent staff working in IT functions is below 5 percent.

- The TA has its own source of financing outside of the budget cycle with a legal framework dedicated to investments in IT.
- Systems are mainly integrated and developed in Java, Python, or similar programs, as well as through microservices architecture and development methodologies of the DevOps type with mobile applications for procedures.
- Hybrid cloud (public and private) processing and storage services are used, making use of non-structured and structured data architecture for information warehouses and application programming interface (API) services for displaying and consuming information has been developed.
- Reception of data in digital media (inputs). Data are considered as the fundamental input of the TA. The way in which they are gathered is evaluated to determine the progress made in the digital data reception, which allows for a paper-free process. This study evaluates the other aspects of the organization, such as the scope of the data policy, existence of a specialized agency responsible for security and data quality, and durability of the specific channels that are used to receive data, such as portals for procedures, tax returns, and payments, information from third parties and especially electronic invoices. The maturity of TAs in digital data reception is characterized by the existence of the following elements:
 - Duly formalized and updated data policy, which establishes general guidelines, governance and oversight mechanisms and criteria for the use of, and access to, information at the institutional level.
 - Internal agency for managing data and information in which the main stakeholders participate in the use of information for tax oversight functions. Its operation is effective, and its decision-making capacity is high.
 - Active data quality control processes in its transactional platforms, as well as data integration and congruence.
- Integrated information security management with advanced solutions to prevent unauthorized network intrusions, control of databases, active monitoring of information traffic and consumption, systems of border protection and application layer systems and full traceability.
- Current system for carrying out the registration and updating of taxpayer information, either in-person or online, which records information attributes additional to the basic data and also cross-checks with other official sources of information.
- System for receiving electronic multi-purpose tax returns that calculates or validates data congruence and/or structure and permits electronic payments to be made from bank portals.
- Legal power to request information from other entities that manage personal taxpayer data, which it then obtains easily.
- Mandatory use of electronic invoicing, a system (centralized or decentralized) for invoice reception and issue with data structure validations and electronic seals, and specific data catalogs and numeric validation, as well as attributes for metadata.
- Digital products and services (outputs). Information processes generate products and services that serve taxpayers and permit the TA to carry out the oversight activities needed to achieve its objective. In this case, there should be automated processes, such as pre-filled tax returns, parameterized tax inspection programming or big data congruence control in real time. The maturity of the TA in this dimension is characterized by the following elements:
 - Indicator management system based entirely on data provided by its transactional systems
 - Risk models with tax compliance control mechanisms based on analytical models of the available data
 - Digital services for taxpayers based on processing existing data

- Pre-filled income tax and VAT returns without changes by taxpayers with an acceptance rate of more than 75 percent
- Digital portal in which all digital services are integrated
- Data use and/or sharing for purposes other than fiscal

The final part of this paper translates the application of the index to the SII's specific situation, on a numeric scale based on the information and analysis presented. This enables the comparison of different tax administrations by following the same evaluation criteria.

2

The Case of Chile

2.1. Digital Ecosystem

National digital policy

The government of Chile has been one of the most active in terms of digital development initiatives, which have made their way into national agendas, the most recent being for the period 2013-2020, designated *Imagina Chile*,³ which was constructed through a participative process involving public and private institutions, academia, and civil society in a public/private digital development council (Consejo Público Privado de Desarrollo Digital). The key areas of the digital agenda are development rights, connectivity and inclusion,⁴ government, economy, and skills, which include 13 lines of action and specific measures (Government of Chile, 2015). A ministerial committee (Comité de Ministros para el Desarrollo Digital y la Sociedad del Conocimiento) coordinates the agenda and results are available online.⁵ In terms of its national development policy, Chile's is advanced and includes the government; however, its data sharing policy is still emerging.

Internet access

In January 2020, Chile population reached 19 million people, with 15.7 million internet users (Data Reportal, 2020), representing a penetration of 82 percent⁶ and growth of 1 percent in comparison

with the previous year.⁷ A survey published by the telecommunications under-secretariat (La Novena Encuesta de Accesos y Usos de Internet) reports that 94.2 percent of households can access the internet, and 85 percent of these do so through mobile devices. Of this last percentage, 7 of every 8 households use a smartphone. According to the 2020 Yearbook (Data Reportal, 2020), cable Internet connections represent 55.7 percent of total connections and have an average speed of 91.4 megabytes per second (Mbps), which is 62 percent faster than the previous year.⁸ Whereas 2G and 3G technologies are declining, 4G services have seen substantial growth, reaching 16 million

³ More information about the agenda 2013-2020 is available at: http://www.observatoriodigital.gob.cl/sites/default/files/agenda_digital_imagina_chile_2013-2020.pdf.

⁴ Including the Austral fiber optic project, digital integration of island areas, monitoring of speed and connection quality and the ChileGob WiFi network.

⁵ See: <http://www.agendadigital.gob.cl/#/>.

⁶ In Chile's Agenda Digital 2013-2020, the access to internet objective, as a percentage of the total number of inhabitants, was 80 percent.

⁷ The average in South America was 72 percent, in North America 88 percent and 95 percent in Northern Europe.

⁸ South Korea has an average speed of 103 Mbps, Canada 71 Mbps, Holland 67, Mexico 34, El Salvador 10 and Venezuela 8 Mbps.

BOX 1

State Law on Digital Transformation

At the proposal of the Executive, on October 16, 2019, the Congress of the Republic of Chile approved Law 21.180, which was published on November 11 of that year. This law modified diverse legal bodies in four fundamental areas: (i) digital administrative procedures, (ii) digital issue of administrative acts, (iii) digital communications between State agencies, and (iv) electronic document management. Among the most significant elements of the law are the following:

- All administrative procedures must be expressed by the electronic means established by law, except for legal exemptions.
- Establishes as a principle of deed preparation that the administrative procedures and administrative acts to which it gives rise will be expressed in written form by electronic means, unless there is an exemption established by law.
- Establishes that all communication between the public administration that take place within the framework of the procedure is to be conducted electronically and describes the way in which this should be done.
- Defines general principles relating to electronic media: technological neutrality, updating, functional equivalence, data fidelity, interoperability, and cooperation.
- Establishes that an authorized copy is one generated by the platform from where the electronic file is accessed, which has a means of verifying its authenticity.
- Incorporates as a person's right (i) to provide electronic documents that are not issued by agencies of the State administration, insofar as their authenticity and integrity can be proven, and (ii) to be excused from presenting documents that do not correspond to the procedure or that emanate or are in the possession of any other agency of the State administration.
- Defines that the input of requests, forms or documents will be carried out using electronic documents or electronic formats or means, through the platforms of the agencies of the State administration.
- Establishes that the use of electronic platforms is mandatory for all agencies of the administration.
- Validates both the simple and advanced electronic signature, demanding that electronic documents are always required with this type of certification compared to others (paper documents signed before a notary, for example).
- Establishes that government agencies are obliged to release documents or information in matters of their competence that are necessary for their knowledge or resolution, by electronic means to any agency dealing with the respective procedure that demands it.
- Defines the email address as a valid address for receiving notifications, and other alternative means of notification in exceptional cases.
- Establishes the creation of an electronic file and the general stages of the document cycle within the State administration.
- Incorporates the electronic signature as a replacement for the handwritten signature.
- Establishes new electronic processes for the registration of motor vehicles and civil registration and identification service

connections in 2019. Considering these data, Chile is situated in the highest level for this sub-component of the Index.

Digital government

Chile's Digital Government Division develops transversal platforms, establishes regulations and

cross-cutting policies associated with DT, and supports and guides public services in their DT processes. The main platforms are unique password, single password, electronic signature, unique data, and document digitalization. Some of the public policies developed within the framework of *ImaginaChile* in the sphere of government are:

public procurement, digital government, applications of the State, cybersecurity strategy, digital municipalities, mass digital identity (unique digital password), emergency and disaster information management system, electronic signature, *Chile Atiende Digital*, and open data policy.

Furthermore, Law 19.799 regarding electronic documents, electronic signature and certification services regulates such aspects and complements the recently approved Law 21.180. Equally, given the government's prioritization of digitalization as an instrument of development, on January 24, 2019 it issued a presidential instruction on digital transformation, on which the following short-term initiatives for citizen services were based: (i) unique digital identity, (ii) zero files,⁹ (iii) zero paper, and (iv) coordination and oversight at the maximum level.¹⁰

According to the Digital Government Division, in August of 2019, of 3,517 procedures from 213 institutions that were incorporated into the official catalogue of procedures, 1,732 (49.25 percent) were digital and 1,734 (49.3 percent) were committed for digitalization between 2020 and 2021. Chile also scores highly in digital government, with a legally established DT policy at the State level in place with mechanisms to implement it and make it operational. However, digital interaction among different government agencies is still scarce.

The SII's leadership in the field of DT

The SII is an entity that has traditionally driven the digital development of government and the State. The introduction of electronic tax returns in the 1990s made it necessary for many firms to contract internet services. Activity increased for the suppliers of these services, allowing them to offer higher-scale services to a wider population. This was a key factor in helping the country to achieve such a high level of internet coverage.

Thereafter, following the implementation of the electronic invoice and, more recently, the electronic bill of sale, businesses of all the sizes have had to digitalize their administration and, in this way, develop a digital culture that translates

into more traffic in the SII portal. The most recent example of SII leadership is the role it played during the COVID-19 pandemic. The information it provided helped to get government support to the people in need, mitigating the negative economic effects of lockdown on the population.

Finally, it is worth mentioning that SII services represent approximately 5 percent of all central government procedures. Of a total of 140 tax procedures, 80 percent are digitalized. The crucial role played by the SII in Chile's digital development is an example of best practices in the leadership of the DT process.

Digital identity

According to a presidential directive on digital transformation, the unique digital identity is the personal and exclusive official identification and password of the Chilean government, which will become the unique digital identity of the citizens. This will enable citizens to access the entire network of government services and benefits online easily and securely. Users will also be able to manage personal data, sign documents, and receive notifications on the site. The agency responsible for the control and issue of the unique password is the Civil Registration and Identification Service (Servicio de Registro Civil e Identificación). By March 2020, 6.8 million citizens were already actively using the unique password.¹¹

⁹ Simplification of procedures and digitalization of at least 80 percent by 2021 and 100 percent by 2024. Under its modernization guidelines, public service processes cannot demand documentation from citizens that is already held by the State.

¹⁰ The Digital Government Division was set up, which answers to the General Secretariat of the Presidency and the network of DT coordinators at the institutional level. The ambits in which the Division works are consultancy and coordination, digital leadership and governance, development of solutions and the delivery of shared services. The SII is an active partner and coordinates modernization of the State initiatives, including those relating to DT.

¹¹ The unique password portal is available at: <https://claveunica.gob.cl/institucional>.

BOX 2

Response to the Health Crisis

In the context of the COVID-19 pandemic and consequent economic crisis, the SII demonstrated its capacities in the DT process to address critical situations, often requiring massive responses.

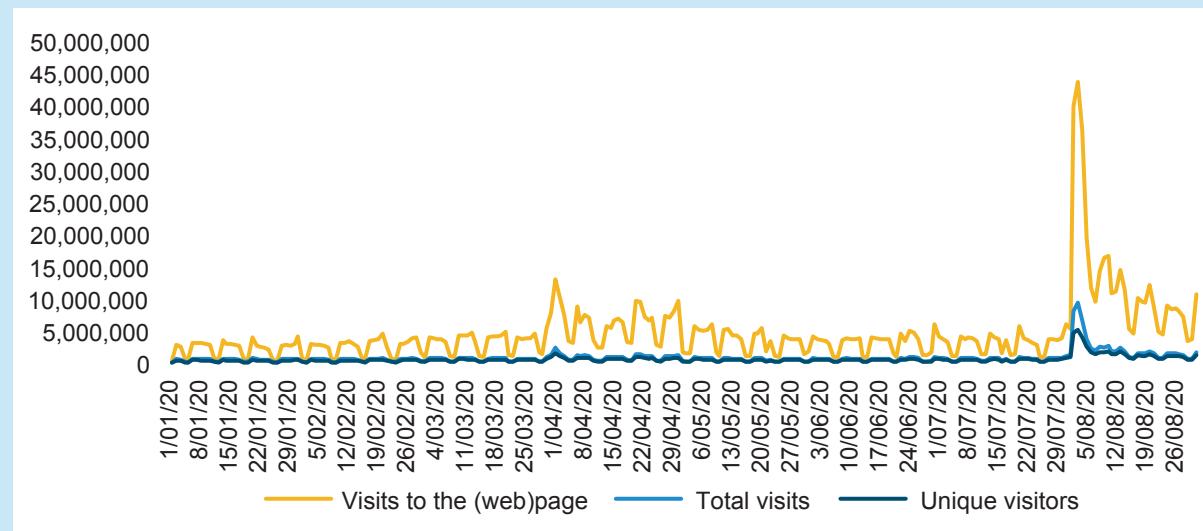
The Chilean government has provided economic support for people through SII channels to alleviate the economic effects of lockdown. By exploiting the information and services available to the SII, it was charged with implementing the following:

- Withheld tax rebate for self-employed workers.
- Advanced rebate of income tax balance in favor for 2020.
- Deferral of 6 or 12 months for VAT payments.
- Suspension of provisional monthly income tax payments.
- Deferral of contribution payments for the month of April.
- Special benefits for self-employed workers.
- Fiscal contribution for the middle class.
- State solidarity loan at a real interest rate of 0 percent.

In the case of special benefits for self-employed workers, the fiscal contribution from the middle class, and the State solidarity loan, the systems and processes had to be modified to satisfy demand in each one of those programs. In total, more than 1.6 million requests were processed and there were more than 40 million visits to the SII website, which is nearly 10 times the normal number of visits and 5 times more in comparison with the first days of the last period of income (2020).

FIGURE 1

SII Website Traffic, January–August 2020



A digital tax authority, such as the SII, has the capacity to rapidly adjust its processes and scale up its capacity in response to a high demand for services. Scalability and flexibility are two digital tax authority characteristics with which the SII was accredited during the COVID-19 health crisis.

The Civil Registration and Identification Service verifies that the digital identity corresponds to the person and cross-checks with its own database. For its part, the Modernization and Digital Government Unit (Unidad de Modernización y Gobierno Digital) provides the authentication mechanism that connects the institutions with the Civil Registration and Identification Service.

The service known as unique password is based on the OpenID Connect and OAuth 2.0 (Authorization Code Flow) protocols, which can maintain access to protected resources for long periods of time and with higher security controls. For this authentication mechanism, the corresponding governmental service must obtain a unique password in access code, following identification of the user by the Civil Registration and Identification Service, which may be exchanged for an access token.

This token enables the user to obtain authorization to access a protected resource and, at the same time, this application would be authenticated by the unique password, which means that the access token is exchanged for an authorization token. This implies that both the user and service institution are authenticated and authorized by the unique password service.¹²

The Digital Government Chile office mentions on its internet portal that, through the project FirmaGob, the advanced electronic signature is currently used by 250 public institutions and 7,000 civil servants to simplify the traditional process of signing documents by hand. The SII has stipulated that the unique password (*clave única*) is an alternative authentication mechanism to the SII tax password (*clave tributaria*), which is already in operation, and with thereby enables the possibilities of connection to the SII website to be extended. Equally, the TA has enabled the use of the tax password for other State agencies, and thereby the interoperability of the systems that use the authentication mechanism administered by the SII.

Each taxpayer is individualized with a unique tax registration number (Registro Único Tributario, or RUT) and its corresponding password. There are three authentication modes:

- RUT/secret password.
- Digital certificate (which must be used in association with the secret password).
- Automatic authentication (which requires a digital certificate). In this case, services to validate the authentication are used directly.

Chile uses an advanced electronic signature system that can ensure the security of information exchanged between government and citizens through the unique password system, as well as between the SII and the taxpayers through the unique tax registration. Digital identity, while yet to be established as a requirement by law, works in practice through the verification of the citizens' identity by the Civil Registration and Identification Service, which also authorizes the issue of both the unique password and unique tax registration number.

2.2. Resources for DT

The DT process, along with being long and ambiguous, consumes a ton of resources. Tax administrations require a firm commitment over time from a high level of the public administration to ensure the availability of the material, financial, and human resources needed to tackle the challenges posed by a process of this nature. It is worth highlighting that, in contrast to other government organizations, TAs are highly transactional entities and therefore the technological capacities that they require to address their communications, information storage, and processing needs are extremely high, specialized, and expensive.

Moreover, governments prioritize the operational continuity of tax processes due to the financial implications it has for its operation. For this reason, TAs have greater flexibility than other government entities when making sure they have the resources they need in the quantity, quality, and timeliness

¹² The access authorization token allows the session of the user and the application to remain open, both identified by the service. However, the token has an expiry date, which may be extended if and when the application sends a request using a refresh token (without the need to repeat the authentication process).

necessary to for consistent, safe, and secure operation. In this context, the matrix analyzes the components that relate to organization, human resources, financing and provision of material resources, strategic planning of information and communications technologies (ICTs), systems, and technical infrastructure needed to understand the conditions that the TA will encounter during its DT process.

Governance

The Chilean TA is comprised of three institutions that depend on the ministry of finance:

- Internal Revenue Service (SII)
- National Customs Service (Servicio Nacional de Aduana, or SNA)
- General Treasury of the Republic (Tesorería General de la República, or TGR).

The SII, SNA, and TGR collaborate to support controls in each one's area of expertise and exchange information in to facilitate TA management, making agreements with a view to combating tax avoidance and tax evasion while improving tax revenue collection. Along with its taxation functions, the SII is responsible for managing the real estate register and road vehicle tax assessments.

The SII has a mainly functional type of structure combined with territorial elements and seg-

mentation of taxpayers and processes. It expressly links its strategy with management, business, and support macro-processes. Its institutional strategy is based on the view of technology as an enabler of a new relationship with taxpayers, one that is present in people's daily lives to promote tax compliance.

The SII¹³ has a functional type of **structure**. Its second level combines the distribution of functions according to taxpayer segmentation (large taxpayers offices), territorial coverage (regional and metropolitan office), and processes (national headquarters) (Figures 2a and 2b).

The SII macro-processes are classified into management, business, and support (SII, 2019a: 32), as shown in Figure 3.

In the SII, the SDI depends directly on the director and is the unit responsible for providing and implementing IT services.¹⁴ Figure 4 details its integrated structure.

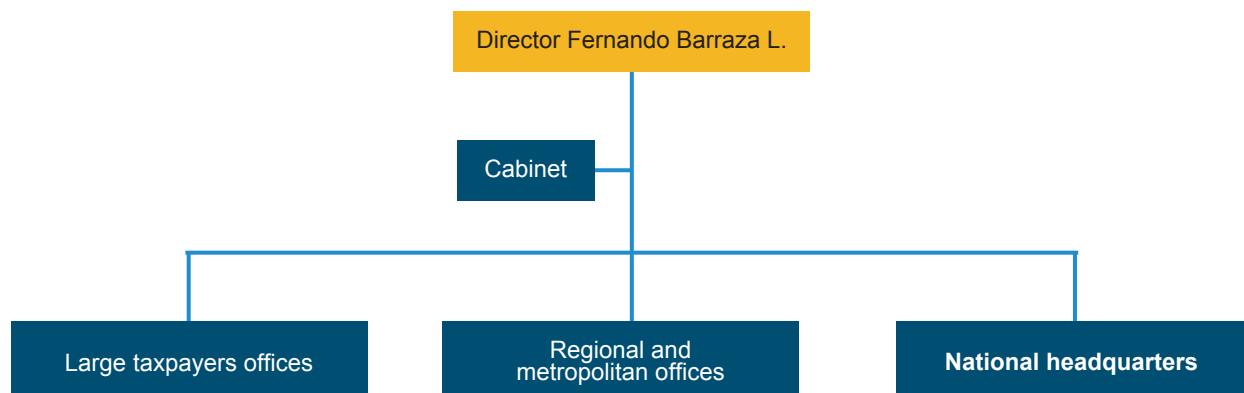
The SDI's mission is to analyze, develop, integrate, manage, and operate the ICTs needed for the development of SII strategies. In particular, its vision includes the following:

¹³ The institutional organigram can be seen at: https://www.sii.cl//sobre_el_sii/organigrama/organigrama.html.

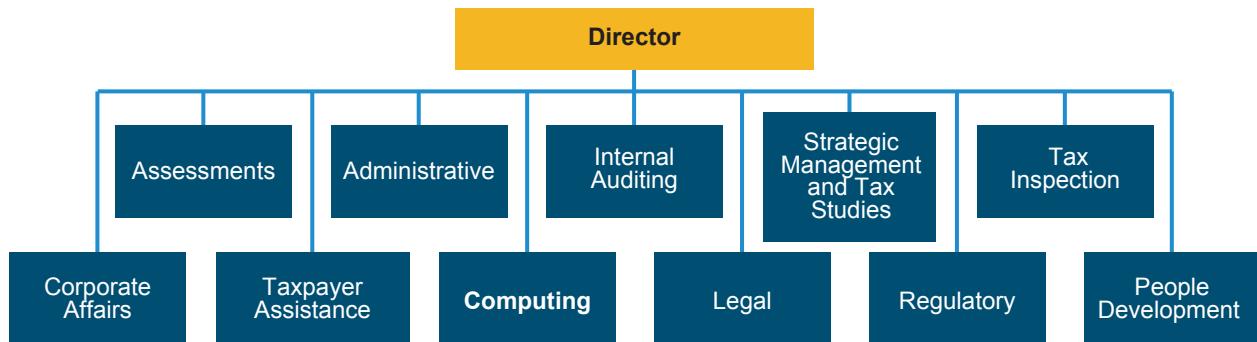
¹⁴ The SDI organigram is available at: https://www.sii.cl//sobre_el_sii/organigrama/organigrama_sd_informatica.html.

FIGURE 2A

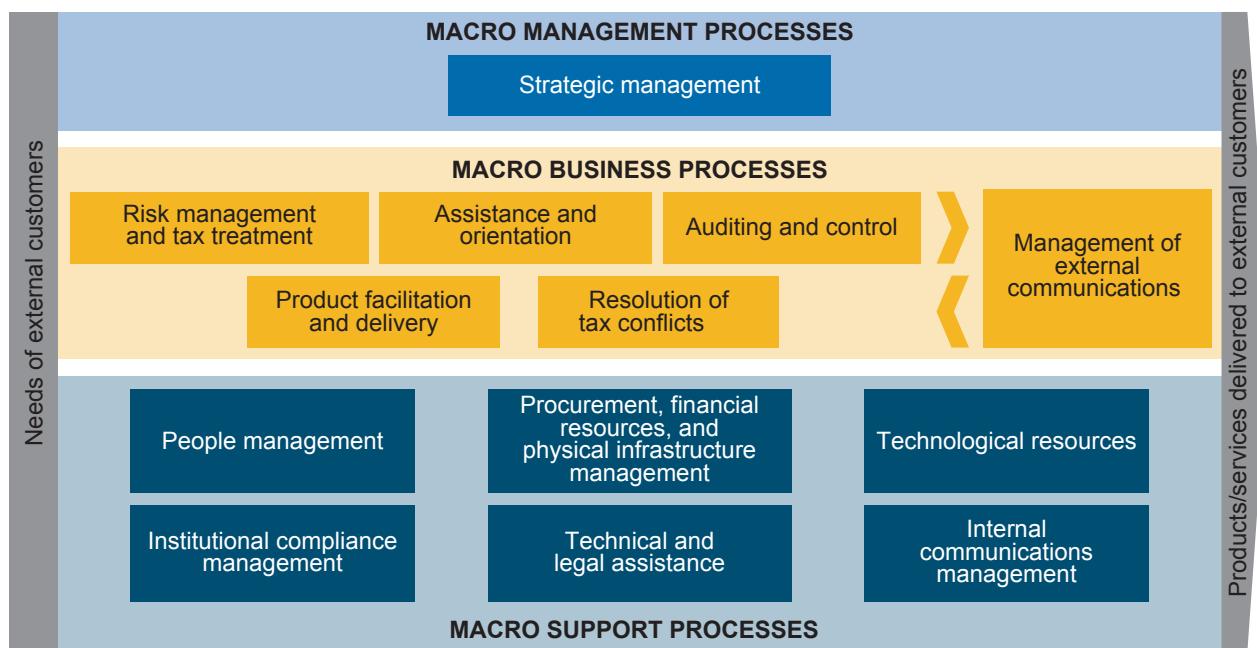
SII Structure at the Management Level



Source: SII.

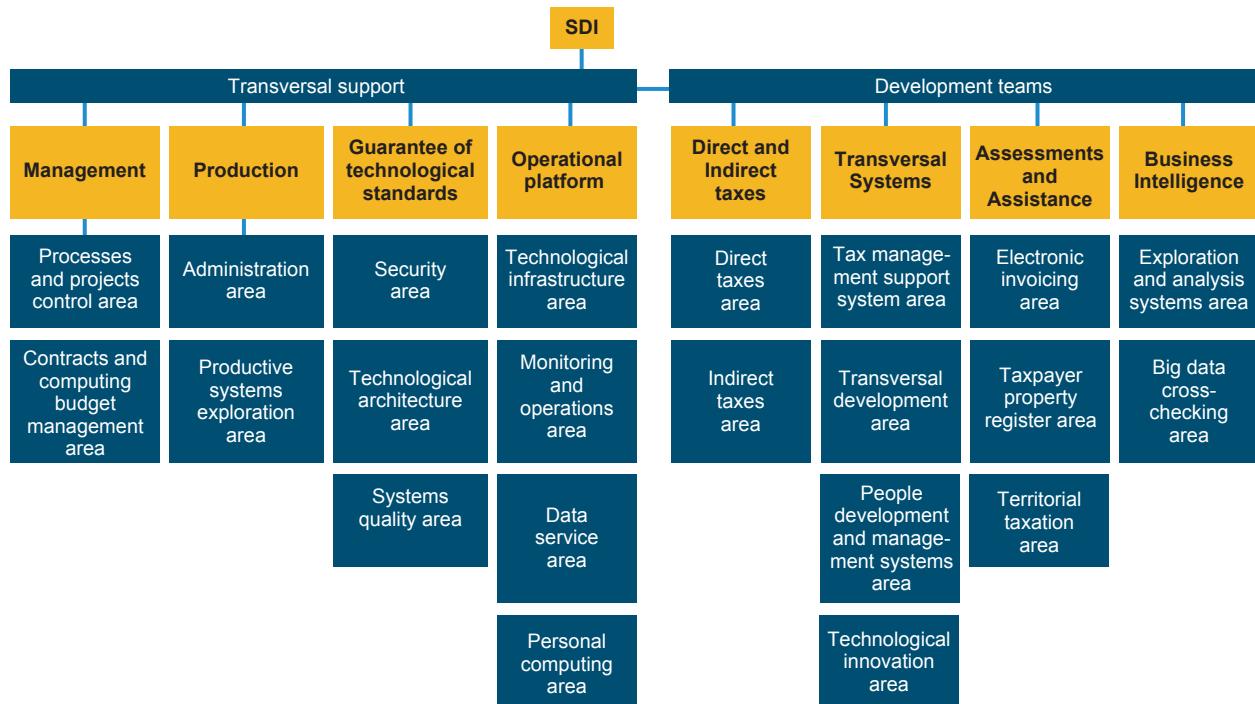
FIGURE 2B**SII Structure at the Division Level**

Source: SII.

FIGURE 3**SII Macro-Processes**

Source: SII.

- Find innovative technological solutions.
- Manage the technological infrastructure to facilitate business services for taxpayers and civil servants (high operational continuity, updated technical support, guarantee safe business services).
- Implement data quality models and controls, based on the definitions of the business areas.
- Protect the organization's technological assets, in order to minimize risks and maximize its operational capacity.

FIGURE 4**Structure of the SDI**

Source: SII.

- Develop the necessary technical and personal skills.

The SDI internal management contributes to IT governance, in particular through the following criteria: (i) project-based management, (ii) allocation of resources to the strategic actions with the highest productivity and institutional impact, (iii) balance between internal development and outsourcing of services, (iv) evaluation of options and models and use of knowledge gained from the experiences of Organization for Economic Cooperation and Development (OECD) countries and other TAs around the world, and (v) systematic and professional selection of service providers.

These practices have enabled the SDI to respond to the strategic needs of the SII and become highly valued by its peers, who are responsible for substantial business processes. This ensures a positive interaction that generates institutional value.

A further outstanding element of governance within the realm of IT in the SII are the recurring mechanisms of collaboration between the business process teams and the SDI, which follows a long internal tradition valuing the contributions of technology to business. These mechanisms have boosted productivity and institutional innovation, for example in the development of the application of algorithms for verification prior to completing tax returns, using internal and external sources of information, and implementation of the business continuity plan.

At the level of governance, there is an advanced level with a balanced structure in which the SDI is not only situated in the second level but, rather, participates actively in the committees in which the business processes are designed, reviewed and evaluated. In the case of the SII, greater digital capacities should be developed in the rest of the organization to bring more decentralized management to the DT process.

Human resources

In terms of human resources, the SII is governed by the general laws of the Chilean public administration and applies the same arrangements, processes, and systems, including salary requirements. However, it can act with a degree of independence when it comes to taking key management decisions about its human resources and the civil service careers. The main applicable regulations are the following:

- Organic Law of Internal Revenue Service (Decree with Status of Law [DFL] 7, 1980) (Ley Orgánica del Servicio de Impuestos Internos, Decreto con Fuerza de Ley [DFL] 7 de 1980)
- Administrative Statute (Law 18,834, 1989) (Estatuto Administrativo [Ley 18.834 de 1989])
- Regulations for the SII Workforce and entrance and promotion requirements (DFL 1, 2004) (Normas sobre las Plantas de Personal del SII y requisitos de ingreso y promoción [DFL 1 de 2004])
- Law 20,853, Institutional Strengthening of the SII, 2015 (Ley 20.853 de 2015 de Fortalecimiento Institucional del SII)

The Chilean government's human resources management policy, which enables the civil ser-

vants who form part of the tax system to receive benefits derived from the current policies of stability, salary competitiveness, and good working conditions, has helped to underpin development within the SII on the basis of solid human capital. This aspect of human resources management policy can be clearly valued when compared with the situation of TAs in other LAC countries.

According to the SII management team, in practice this system enables them to recruit staff with appropriate backgrounds while adhering to their budget allocations. The system has selective and merit-based processes for entrance, advancement according to skills, shared responsibility of civil servants for team achievements, relative salary competitiveness, and a good performance management system.

The SII's People Development Division (Subdirección de Desarrollo de Personas) considers human resources management to be a key element for complying with the organization's strategic definitions and considers that merit, technical suitability, and skill development are critical factors of success in the tax authority (SII, 2019b). In 2018, the administration had 4,981 collaborators in an almost entirely permanent, fulltime workforce.¹⁵

Table 2, based on a report by the Inter-American Center of Tax Administrations prepared on the basis of the International Survey on Revenue Administration (ISORA) (Díaz de Sarralde, 2019), shows the economically active population (EAP) divided by the number of employees working in the tax department (staff working fulltime or equivalent) for selected countries and by the average in high-income countries, including Chile. The table reveals a comparatively high percentage of the workforce in Chile, when measured with this indicator.

According to the SII data, 60 percent of collaborators are between 30 and 49, while 21 percent are between 50 and 59. This is a relatively younger workforce than that reported in ISORA for the group of high-income countries. According to the classification of OECD (2019), 42 percent

TABLE 2

EAP Divided by Employees in Taxation Functions, Data Collected 2018–2019

Country	EAP / total employees in taxation functions
Mexico	2,109
United States	2,012
Chile	1,803
Argentina	917
Spain	913
Canada	465
United Kingdom	441
Average of high-income countries	788

Source: Díaz de Sarralde (2019).

¹⁵ The forms of employment are staff, contract (1 year), fee contracts, and work code.

of TA personnel in the group of American countries included are between 25 and 44 (Díaz de Sarralde, 2019: 32).

The Chilean tax authority workforce achieves a high rating: 68 percent have an education at the university level, nine percent a technical level, and 23 percent secondary education or similar. On average, 52 percent of employees of tax administrations in high-income countries have either a bachelor's or master's degree (Díaz de Sarralde, 2019: 31).

With regard to internal distribution, 23 percent corresponds to the National Headquarters and the Large Taxpayers Office, 5 percent (249 collaborators) to the SDI and 72 percent to the Regional and Metropolitan Offices. The average number of collaborators working in IT in the countries reported in the OECD analysis is 5 percent (OECD, 2019: 122). In 2018, collaborators from all educational levels have training in the areas specified in Table 3. A little more than 59 percent had a background in the disciplines of public bookkeeping; auditing; and accountancy, business administration, and law. Approximately 7 percent had backgrounds in civil engineering and other construction-related careers, and nearly 5 percent in computing and other related areas. These

percentages reveal the need to employ a greater number of specialists in the areas required for the advanced digitalization of the TA.

The SII staff turnover index was 3.94 percent in 2016, 0.95 percent in 2017, and 0 percent in 2018. The upper limit considered by human talent managers as acceptable is 15 percent, and they highlight the risks of little dynamism and an ageing workforce if turnover remains at zero. However, in this particular case the previously mentioned age structure should be considered. The index's positive behavior derives from diverse factors: appreciation of job stability, attractive salaries, the mission-based aspect of the job, and institutional prestige.

According to SII information, 57 percent of civil servants earn above CLP 1 million, whereas the equivalent amount in the private sector hardly reaches 19 percent of this figure. An additional element that helps to make positions at the SII attractive and explains the high staff retention levels is the system of annual performance agreements that apply to all public entities. These agreements establish objectives and goals for the different work teams, agreed with the ministry of finance. The annual collective performance increase for each work team depends on overall achievement

TABLE 3

Classification of SII employees according to their function

Disciplines, including all educational levels	Number	%
Public bookkeeping, auditing, and accountancy	1,814	36.4%
Commercial engineering, business administration, and related	758	15.2%
Law and related	380	7.6%
Civil engineering and construction related	344	6.90%
Computer engineering, systems and related	243	4.90%
Architecture and related	115	2.30%
Agricultural engineering and related	88	1.80%
Education, pedagogy, and related	32	0.60%
Publicity, communications, and related	16	0.30%
Economists and statisticians	3	0.10%
General training, intermediate training, technical, assistant or secretarial qualifications, among others	1,188	23.90%
Total	4,981	100.0%

Source: SII.

of management goals. The SII established for the year 2019 that if this figure was equal to or greater than 90 percent, then the team incentive would be 12.6 percent; if achievement was between 75 percent and lower than 90 percent, then the incentive would be 6.3 percent; and if under 75 percent, then the incentive would be 0 percent.

Among the high-income countries reported in ISORA, 60 percent link payment to performance, 54 percent set salary increases for good performance, 24 percent cut salary in the event of bad performance; and in 27 percent bad performance can cancel the annual increase. In Chile's case, the first three of the above practices are linked to work team performance.

A further factor that influences productivity and the alignment between the goals of the administration and the performance of senior and middle management is the performance evaluation model. The model includes between four and six areas, and the area of institutional ethics and application of best practices, which guides the conduct of civil servants and management.

The total IT staff is 249, which represents 5 percent of the total of SII collaborators. Based on information from OECD (2019), Table 4 presents the percentage of ICT personnel for selected countries.

TABLE 4

TA Employees Allocated to IT, Percentage of Total Employees, 2017

Country	%
Chile	3.9%
Chile (2019)	5.0%
Argentina	3.1%
Mexico	4.2%
Denmark	8.7%
France	5.1%
Spain	6.8%
Australia	8.3%
Canada	9.4%
USA	8.7%

Source: OECD (2019).

The SII is considered to have achieved an advanced level with regard to the management of specialized human resources for its DT. It manages its human resources in the favorable environment of the Chilean public administration, governed by both general and its own regulations, as well as structured and generally advanced processes and systems. Moreover, the system permits the organization to attract and retain civil servants and employees with the appropriate backgrounds and skillsets. Together, the practices of teamwork and annual performance agreements and their linkage to salary increases, a well-designed performance evaluation system, and the support of the senior public management framework have helped to build a good quality human capital base in Chile. However, the number of people specialized in technology, data, and information, and who are employed in areas other than the SDI, is still considered to be low.

Goods and service procurement financing and policies

SII revenues are mainly sourced from fiscal contributions. The SII executes its legally approved annual budget independently, complying with public procurement regulations and arrangements and the laws applicable to the civil service. In 2017, the SII expenditure budget represented 0.98 percent of the revenues collected by the administration. For the countries participating in the ISORA survey, collecting 100 monetary units costs, on average, 1.53 units. This cost diminishes insofar as the level of income rises: from 2.67 percent in low-income countries to 0.84 percent in high-income countries.¹⁶ The countries of the CIAT record an average cost of 1.24 percent, which is higher only to that recorded on average by high-income countries. The proportion of salaries over current costs of the SII is 89.63 percent, whereas the ISORA average is 66.7 percent, the CIAT country average is 64.1 percent, and the

¹⁶ Chile is classified in the high-income group. ISORA compiles information from TAs in 159 countries, which represent 90.4 percent of world gross domestic product (GDP) and 88.5 percent of the world's population.

TABLE 5**OPEX and CAPEX and Investments in Technology (in CLP million)**

Exercise	OPEX: goods and services	CAPEX: hardware and software	Total	OPEX %	CAPEX %
2009	8.137	3.686	11.823	69%	31%
2010	8.131	3.187	11.318	72%	28%
2011	6.806	5.471	12.277	55%	45%
2012	6.140	7.798	13.938	44%	56%
2013	5.014	4.300	9.314	54%	46%
2014	5.023	3.181	8.204	61%	39%
2015	6.490	10.504	16.994	38%	62%
2016	7.336	6.598	13.934	53%	47%
2017	6.062	5.996	12.058	50%	50%
2018	5.314	3.576	8.890	60%	40%
2019	7.500	4928	12.428	60%	40%

Source: SII.

average for high-income countries is 73.2 percent (Díaz de Sarralde, 2019: 26–27).

The SDI annual budget, which reached USD 16.6 million on average between 2017 and 2019, represented 5.8 percent of the SII budget. OECD countries invest, on average, 12 percent under this budget heading. Likewise, USD 224 million has been allocated for operating costs (OPEX) and capital expenditure (CAPEX) in the period 2009–2019. In the latter year, the downward trend in place consecutively since 2015 was reversed, with a figure higher than CLP 12,428 million (USD 17.5 million).¹⁷ A third of the countries reported in the OECD data indicate that they allocate more than 10 percent of operating costs to the IT function (OECD, 2019).

According to the CIAT report based on ISORA 2017, ICT costs in the Chilean TA represented 7.66 percent of OPEX and 79.26 percent of total CAPEX. The ISORA average is 6.35 percent and 56.15 percent, respectively. For the high-income countries, ICT costs are 10 percent of OPEX and 73 percent of CAPEX. For the CIAT countries, these proportions are very similar.

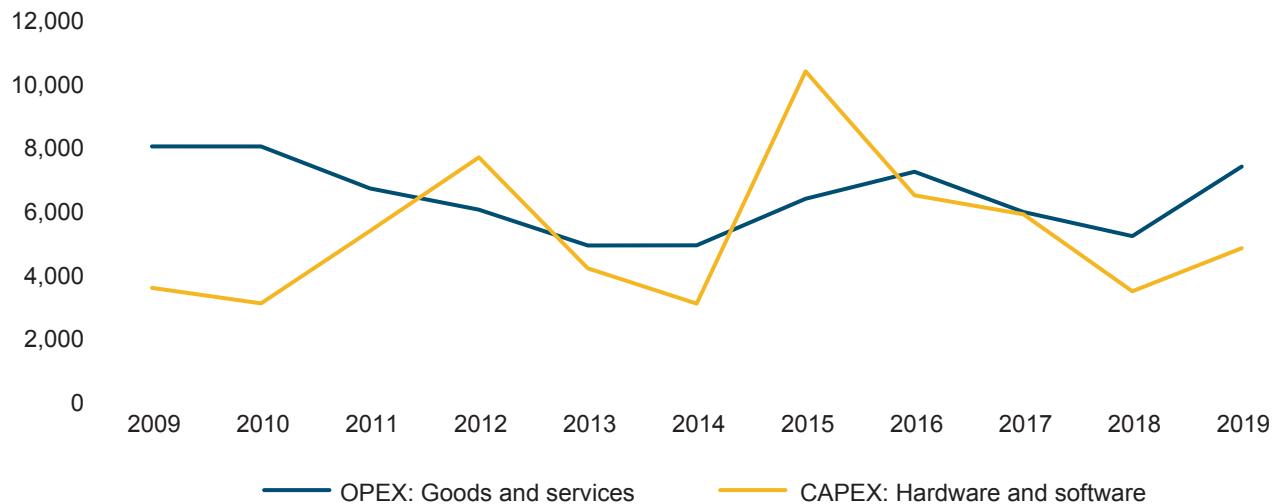
The year 2015 has seen the highest investments since 2009, with around CLP 17 million (USD 25 million) invested, of which 38 percent was allocated to goods and services (OPEX) and

62 percent to hardware and software (CAPEX). In 2010, OPEX represented 72 percent, the highest proportion during the period. For 2018 and 2019, the proportion was 60 percent for OPEX (above the average) and 40 percent for CAPEX.

Despite the fact that a cyclical trend is noticeable in the period in technology, costs, and investments, the results associated with the application of technology to tax administration processes show the following signs of growth: tax collection increased 1.5 times, the number of income tax returns 1.7 times, VAT returns 2.4 times, the quantity of electronic tax documents 5.5 times, and annual visits to the institutional website 8 times. This suggests that resources allocated to the information systems area are highly productive.

Qualitatively speaking, the SDI reports that in this period it has shifted from investing in its own infrastructure—with limited scalability, faster obsolescence, institutional risks, and the investment of its own resources—to a strategy oriented toward outsourcing of services (which complements the

¹⁷ Data for 2009–2018 collected by the SII (2019c). The projection for December 2019 was taken from the budget information presentation at the SDI's Operational Platform Department.

FIGURE 5**OPEX and CAPEX in Technology (in millions of Chilean pesos)**

Source: SII.

current technological infrastructure), with on-demand scalability, cloud, and big data services, risk-sharing with suppliers, and orienting its own financing to ensure operational continuity. This change of strategy is reflected in the allocation of resources between OPEX and CAPEX, mainly over the last two years. The aforesaid strategy is also reflected in the use of resources allocated to technology between 2015 and 2018 in which, overall, 48 percent were earmarked for services, 28 percent for software, and 24 percent for hardware.

One noteworthy element observed in the SII experience is the coherence between its policies of digitalization, the modernization of the State, and the current procurement regulations applicable to the Chilean public sector, made up of 850 entities that together spend USD 13,000 million on procurement. These purchases are made through the transactional platform *ChileCompra*, which facilitates coordination between the demand of public procurement agencies and offers by suppliers.¹⁸

The modes of procurement¹⁹ include the framework agreement, public bidding, private bidding, and direct deals. The modes of procurement used by the SDI between 2015 and 2018 were, in the case of software, direct deals in 26 percent of

purchases (USD 5.5 million) and bidding in 74 percent of purchases (USD 15.8 million). In the case of hardware, direct deals were made for 8 percent of purchases (USD 1.5 million), bidding for 73 percent (USD 13.4 million) and the framework agreement for the remaining 19 percent (USD 3.6 million). In the procurement of services, direct dealing was used for 23 percent (USD 8.5 million), bidding for 16 percent (USD 6 million), and the framework agreement for 61 percent (USD 22.6 million), which is in accordance with the permitted modes

¹⁸ *ChileCompra* is a decentralized public service, dependent on the ministry of finance, which was created by the Procurement Law (Ley de Compras Públicas 19.886). It is responsible for managing the platform and has a single regulatory framework. It operates under the principles of transparency, efficiency, universality and accessibility.

¹⁹ The framework agreement is a catalogue of products and prices, which enables negotiation with the supplier. When valued at above 1,000 monthly tax units, an intention to buy from the market must be signaled. Public bidding is competitive through a public competition. Private bidding is an exceptional modality made by direct invitation to participants and must be based on grounded decisions. Finally, direct treatment is entered into with the sole suppliers of a particular good, for example.

in the system of public purchases for the different types of procurement carried out by institutions (SII, 2019c). Once the procurement decision has been taken, goods or services are available, on average, within 45 days.

The service contracts lasting more than a year are permitted in Chilean procurement legislation, depending on budget allocations.²⁰ In the IT area, some of the functions or services involve outsourcing, which means that the flexibility of service contracts constitutes an enabling element of innovation. Among such services are development (programming), DevOps (deployed in certification and development), Level 3 support for the analytical platform and big data and Level 1 support for the desktop Teams platform.

The SII has broad experience in the use of framework agreements for purchasing and contracting goods and services, applying characteristics that are suited to its strategy of complementing services with specialist firms, supported by OPEX-type costs. The innovations introduced into these framework agreements, with a possible six-year subscription period and the incentive for suppliers of negotiating purchases throughout the entire public sector (instead of case-by-case) has resulted in benefits, such as the entry of more proprietary technology brands, more dynamic technology renewal, more direct responsibility in post-sales and maintenance, more certainty over delivery times, the incorporation of more suppliers, more frequent updating of catalogs, and services more adapted to institutional needs.

A further relevant aspect of the SII's experience as a purchaser of technologies is the value added by the information available in the *Chile-Compra* platform and its analysis for decision-making purposes. The platform currently provides a high rate of data availability, variables for comparative and statistical analysis, detailed information about suppliers, and other reports for users.

The budget law (Ley de Presupuesto) grants autonomy for the procurement of goods and the contracting of services, which must be governed by the arrangements established in the procurement law (Ley de Compras) and the public market regu-

lations (Mercado Público). Irrespective of the annual financing provided by the budget law, multiannual contracts may be signed when justified by enhanced public expenditure efficiency and that comply with regulations established in the procurement law. In the IT area, some of the following functions or services involve outsourcing part of their functions:

- Development: programming
- DevOps: service deployment in certification and development
- Level 3 support for the big data platform and software as a service (SaaS)
- Level 1 support for the desktop team platform.

In terms of goods and services financing and procurement policies, the SII has achieved an intermediate level with sufficient financing to cover the needs that have arisen from its DT process up until now. It is, however, dependent on the budget cycle with the consequent uncertainty that this implies when dealing with annual allocations. Equally, the SII does not have a dedicated legal framework for the processes of authorizing and contracting IT projects.

Strategic planning

In the SII there is a noticeable planning culture that prevails throughout the organization's management. The metrics used to measure the achievement of the strategic goals have medium- and long-term horizons, aligned with the institution's strategic areas; however, the operational plans such as the collective performance agreement (Convenio de Desempeño Colectivo), the budget plan (Plan de Presupuesto), the tax compliance management plan (Plan de Gestión de Cumplimiento Tributario, or PGCT), and the strategic projects plan (Plan de Proyectos Estratégicos) have only an annual horizon. This means the organization can be guided by a strategic approach

²⁰In many LAC countries, multi-annual contracts are not permitted, thereby limiting the chances of negotiating better conditions for digitalization services contracts.

but with operational plans in tune with the existing conditions and immediate needs of the Chilean TA.

The SII strategic management is periodically documented in its institutional strategic plan (Plan Estratégico Institucional, or PEI), whose most recent edition covers 2019 to 2023. It is worth highlighting that while this document is updated annually, it maintains its multiannual structure. In the plan, the institutional strategy is expressly linked with the map of macro-processes to show the relationships between the external customers and services and products provided for them by the institution. In this way, a taxpayer-centered approach is introduced and the interrelationship between strategy and operation is made explicit.

The strategic decisions in terms of IT are taken under the auspices of the national director, with the support of the SDI and a strategic computing committee (Comité Estratégico Informático). To guar-

antee the harmony of the objectives and actions at all three levels, it is critical that their plans, strategies, projects ,and actions are coherent. This calls for an alignment of the PEI and the PETIC, which was formalized for the first time in September 2018 for an extendable period of four years.

This plan seeks to support the strategic areas proposed by the SII in their entirety, through the application of its style of institutional leadership and the formation of high-performance teams. The key areas are the following:

- Transversal implementation of the tax compliance management model (Modelo de Gestión del Cumplimiento Tributario, or MGCT)
- Implementation of the MAAC
- Consolidation of the process-based management model
- Institutional ethics and best practices

BOX 3

Information and Communications Technologies Strategic Program (PETIC), 2020–2023

The PETIC has five programs that cut across the strategic areas. Each program is broken down into subprograms and initiatives that are subject to planning and programming.

The strategic programs and subprograms of each area are the following:

Architecture and Innovation Program: (i) prepare and execute a plan to arrive at a reference architecture that can evolve and be flexible enough to rapidly adopt new technologies, (ii) define and execute a plan for the evolution of the SII business systems, and (iii) structure the function and processes of innovation in the SII and within the SDI.

User Experience Program: (i) implement service management models from the SDI to its customers (taxpayers and SII civil servants) and (ii) improve the quality and functionality of its applications.

People and Organization Development Program: (i) identify and develop skills for each position in the SDI, (ii) define the change management strategy, (iii) apply goals according to the SDI indicators, (iv) encourage collaborative work through high performance teams, and (v) outsource technical specialties.

Risk Management Program: (i) implement a cross-cutting security management model (confidentiality, integrity, availability) including governance, updated security roles and responsibilities, processes and procedures, external audits and ISO 27001 certification, (ii) implement the SDI risk management plan including execution of the mitigation plans, and (iii) implement the actions of the SII business continuity plan, which relates to the continuity of information system services, including the policies and regulations for the disaster recovery plan.

Processes and Best Practices Program: (i) define governance and the practices and tools of SDI processes in coherence with SII process-based management, (ii) implement processes under the new approach, (iii) carry out audits, and (iv) continually improve processes.

To arrive at this vision, the SDI applies the principles of alignment with the PEI of the SII, by applying risk management in all its projects or activities, data and information protection, people development, standardization and promotion of process adherence, and use of the reference architecture that has defined the institution.

The general strategy is to continue to grow and mature as an institution, which is possible by generating the highest possible contribution to business value. This takes a consistent focus on applications integration, project management, suppliers, services, business architecture and strategy, communications, security, and information and communication technology (ICT), rather than solely on final users and managing the infrastructure, which are both considered to be commodity-based, generic contributions. Initiatives in ICT are therefore correlated with the previously mentioned strategic areas, as shown in Table 6.

Within the SII planning environment, the development of a business continuity plan (BCP)

is worth highlighting. Based on experience with catastrophic events in Chile, the Office for Institutional Risk Management designed a series of strategies and defined the departments responsible for identifying critical processes and services, as well as the actions necessary to reconnect them in the shortest time possible. This plan places particular emphasis on the ICT processes that provide support for the main business processes to avoid interruptions to State revenues.

The incorporation of formal internal collective mechanisms for policy-making and strategic decision-making on technological and financial resources in the ICT processes could lead to improvements in institutional governance and IT infrastructure that would help to better guide TAs. The PETIC already incorporates elements aimed at improving governance in specific areas of the SDI, such as information security, risk management, and process-based management.

Under the strategic planning heading, the SII has reached an advanced level through the align-

TABLE 6

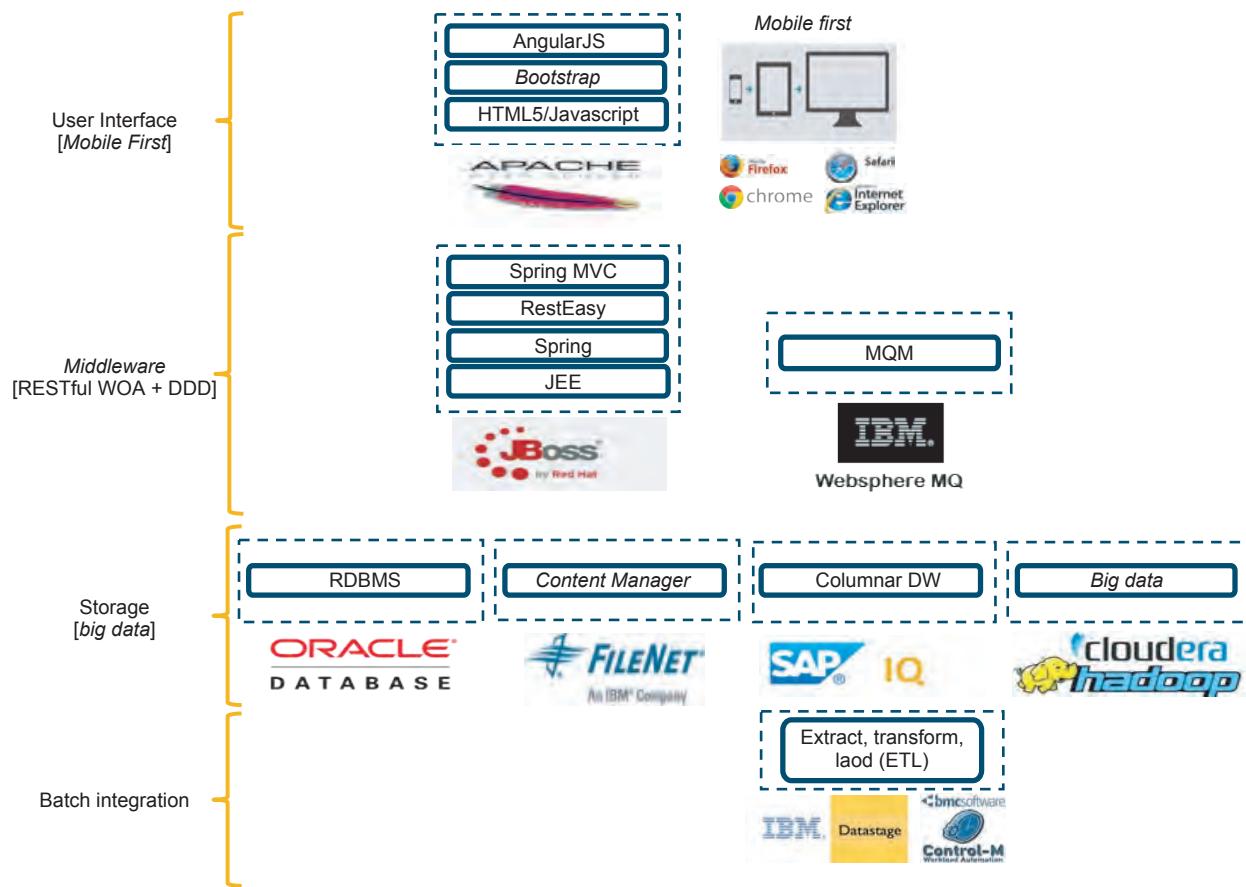
Strategic Alignment of the SII

Strategic SII area	Strategic SDI area	SDI alignment
Transversal implementation of the MGCT	Architecture and innovation	Incorporation of new technologies to facilitate integration of multiple sources of information (internal and external).
Implementation of the MAAC	Architecture and innovation	Innovation and adoption of new technologies to improve and create new services, and inauguration of new channels facilitating application usability and simplicity.
	User experience	Continuous improvement of the services with special attention paid to critical interactions.
Institutional ethics and best practices	People development and organization	Develop skills and skills to get well-trained people who are committed and aligned with the SII's current and future challenges, and who are loyal to the institutional values.
	Internal processes and best practices	Process adherence
Installation of the process-based management model	Risk management	Process adherence, greater control, and security regarding key SII business processes.
	User experience	High standards of service management.
	Architecture and innovation	Support for changes to business processes using innovative solutions.
	Internal processes and best practices	Process adherence.
	People development and organization	People development and new capacities.

Source: SII.

FIGURE 6

SII Development Architecture



Source: SII.

Notes: RDBMS: relational database management systems.

ment of its strategic goals with the PETIC, collaborative mechanisms between the business process units and the SDI to develop innovations and satisfy operational needs, the search for effective management models within the SDI, and continual improvements of its human resources management policies. However, the PETIC still lacks an explicit data management and information security policy.

Functional system integration

At the system integration level, the SII is structured using a three-layered development architecture:

- Users: the components are orientated to facilitate user interaction with the system.

- Application and data: the layer provides interfaces to access the functionalities of one system from another.
- Storage: its function is to guarantee the flow of data within a system.

Components:

- Presentation: Apache and JBoss 7 web servers or superior
- Data services: Eculink and JBoss 7 or superior
- Back-end: Oracle, Sybase IQ, SQL Server databases, big data with Cloudera Hadoop and asynchronous messaging with IBM Websphere MQ
- Business intelligence: SAS and OBI

This solution enables the SII to carry out efficient functional integration, given that it helps coordinate all the domains of its systems in a clear and transparent way both for users and for the internal management of systems and information. As a complement to the above, three types of integrations have been defined for the data within the domains, providing services for applications that require interaction:

- The use of HTTP synchronous services
- The use of asynchronous queue services
- Interactions at the data level (ETL)

In the center of its integration strategy, the SII has established an integrated tax compliance system (Sistema Integrado del Cumplimiento Tributario, or SICT) to support civil service personnel management. The system groups together the different services of the SII and enables interaction to be centralized at a single point to carry out the following tax procedures:

- Administration: support applications for administrative management
- Income: support applications for income tax process
- VAT: support applications for VAT processes
- Real estate: support applications for property tax processes
- Property registration: support applications for taxpayer registration and identification processes
- Transversal: support applications for cross-cutting processes
- Electronic invoicing: support applications for processes related with electronic invoicing

The architecture of this solution can coordinate the diverse components needed to make operation of the integrated system functional. For this purpose, it incorporates into the higher layer user interface (UI) tools and frameworks that, as they are homologated, not only provide a better user experience but also make for cleaner vertical integration with the data consumption layer and with

the functionalities established in the specific systems (income tax, VAT, etc.), as shown in Figure 7.

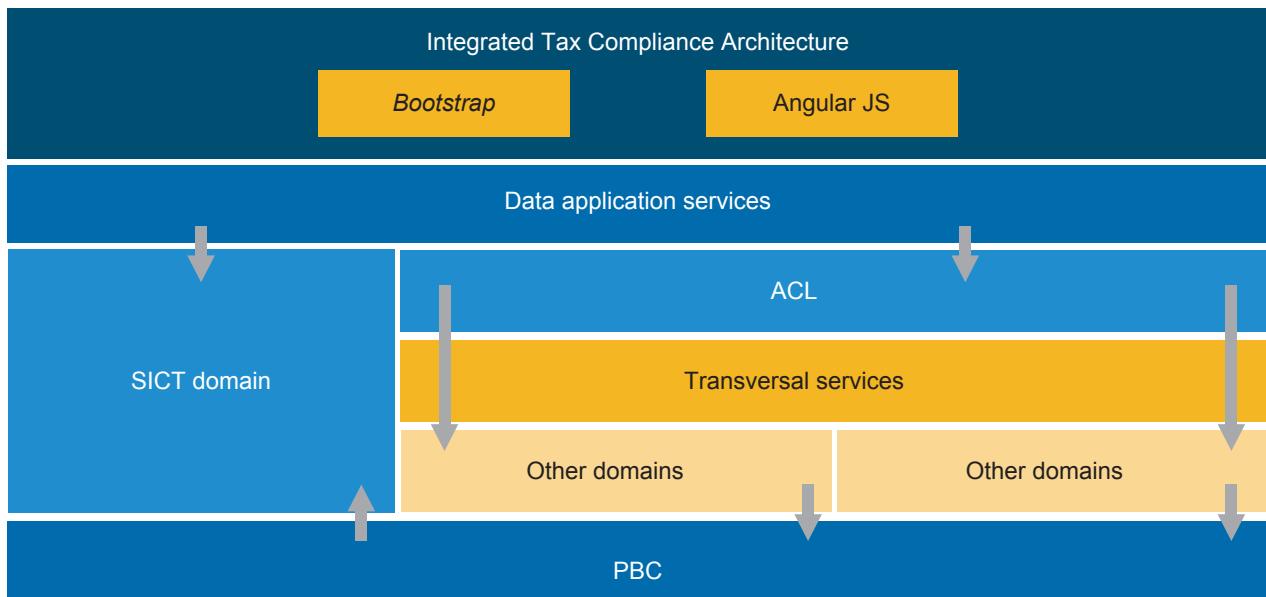
One of the most significant products of this integration strategy is the VAT returns proposal, which, as previously mentioned, has permitted the SII to set the benchmark for the region. From the integration point of view, this product is a fine example of logical structuring. Its integration process was based on the following premises:

- Using vectors, or predefined rules, to pre-calculate intermediate results, through logical and numeric operations known as the purchase and sale register (RCV) (registro compra y venta)
- Distributing processing between the available technological platforms, fully exploiting the potentialities of each one
- Using batch processes to carry out massive and periodic calculation of vectors
- Carrying out information integration processes complemented and modified by the taxpayer when filing the tax return
- Constructing proposals for simple code-based operations using vectors
- Using information sources available to the SII, such as the RCV, electronic bills of sale, electronic bills of third-party service provision and income information, among others
- Incorporating complementary information provided by the taxpayer
- Integrating with the existing systems that support VAT management

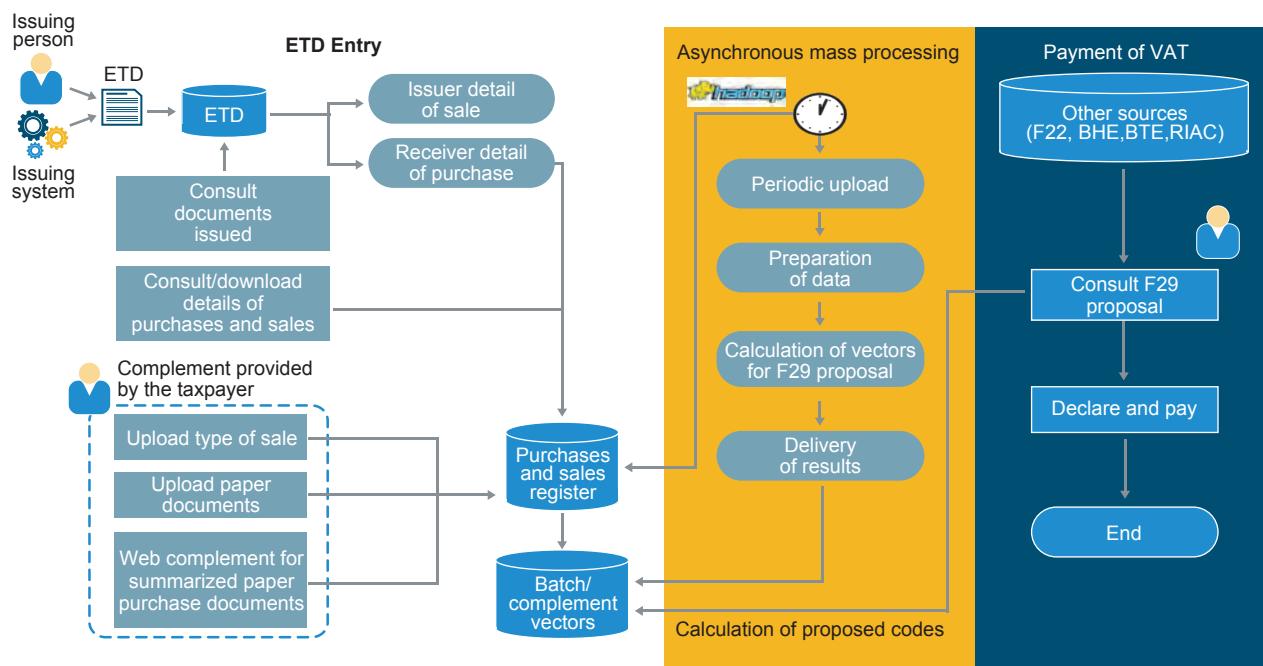
Figure 8 shows an operating scheme for the integration process that helps elaborate the VAT return proposal.

Finally, the SII integration strategy is also aligned with a service-sharing policy at the central level of government, through integration with the state electronic services integration platform (Plataforma de Integración de Servicios Electrónicos del Estado, or PISEE), which shares many of its services with other public institutions (Table 7).

In general, the SII has achieved an advanced level when it comes to integrating its systems. It

FIGURE 7**SICT Architecture**

Source: SII.

FIGURE 8**VAT Return Filing Process****Operating model**

Source: SII.

TABLE 7**Services Shared by the SII**

No.	Services shared
1	Registered activities
2	Termination of business activity
3	State of document stamping
4	Taxpayer identification
5	State of invoicing
6	State of bills of service
7	Validation of invoice barcode
8	Validation of real estate owners
9	Validation of owner occupiers
10	Real estate assessment
11	Condition of real estate
12	Detail of real estate
13	Detail of addresses
14	Summarized detail of real estate
15	Real estate debt
16	Validation of the communal homeowner
17	State of the business
18	VAT verification
19	Taxpayer operations
20	Category of the firm
21	Last VAT declaration
22	Verification of income
23	Verification of various income codes
24	Last income declaration
25	Number of employees
26	Verification of presumed income
27	Negative annotations
28	Legal representatives
29	Multiple partners
30	Type of limited company
31	Business partners
32	Date that trading began
33	Detail of negative annotations
34	Authorized users of web services (WS)
35	Verification of partner
36	Type of taxpayer
37	Details of real estate assessments
38	Tax assessment query
39	Business addresses query
40	Business partners query
41	Consultation of authorized documents
42	Taxpayer situation

Source: SII.

has agile development methodologies and reliable support mechanisms for maintaining operational continuity; the architecture of its systems enables it to share services; and the programming language used is Java or similar. However, the use of a microservices architecture, as well as *DevOps*-type development methodologies, is still in the incipient stage.

Technological platform

The SII technological platform has permitted it to efficiently provide taxpayers with digital services and information. It is focused on providing operational stability and continuity for its services, and uses a broad range of technologies, both licensed and open source, which have given it the operational capacities needed to support the active systems and to allow it to grow organically. The main technologies embedded in the current SII platform are the following:

- IBM and Oracle Sun technology servers
- Operating systems: Solaris, Aix, Windows Server and RedHat
- Back-up system: Tivoli Storage Manager
- Storage: Hitachi and EMC2
- Communications: Cisco and Checkpoint equipment
- Middleware: Eculink, Apache and JBoss
- Database engines: Oracle, SQLServer and Sybase IQ
- Big data: Oracle with Cloudera Hadoop
- Private cloud: based in VCE Vblock, VRail virtualization, and VMWare

According to the architecture defined by the SII, every application of every business or domain provides simple object access protocol (SOAP) or representational state transfer (REST) web services, of which only some may be used directly by external entities for the following purposes:

- Presentation: Apache and JBoss web servers
- Business rules: Eculink Services, Apache Web Services and JBoss
- Back-end: Oracle, Sybase IQ, SQL Server and Hadoop databases.

The SDI deploys a variety of database search engines to satisfy the specific needs of the different application systems. The most commonly used is the Oracle search engine, whose main function is transactional applications processing. In contrast, for processing large volumes of data, such as required in analytical processes or data mining, the SDI can use the SAP IQ search engine. There are other database search engines—such as SQL Server, MySQL, and PostgreSQL—which have specific uses that are tailored to particular solutions.

In terms of storage, the SII has set up a storage area network (SAN) whose main function is to provide centralized, robust, and safe access to data for the servers connected to it, with suffi-

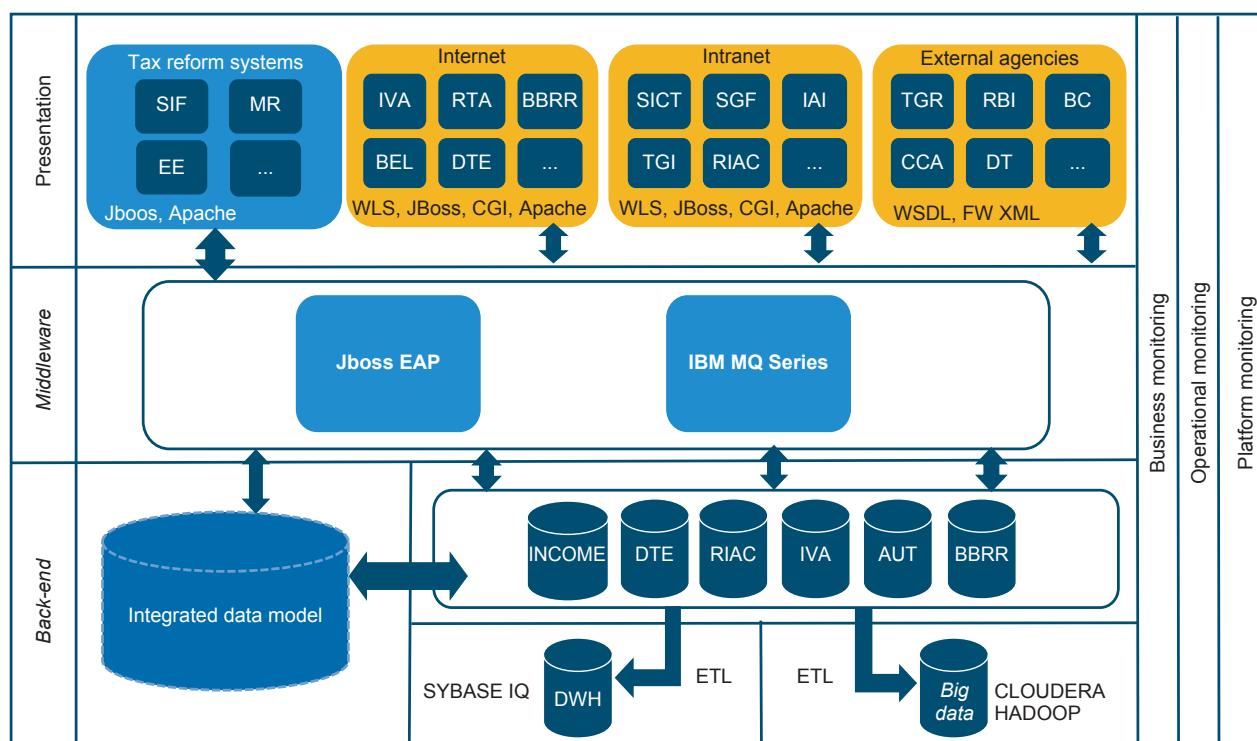
cient bandwidth to satisfy application and database needs. Furthermore, the SAN can be scaled up with network switches that mean units can be expanded by using blade switches. The data warehouses belonging to this network have a RAID level of protection, a redundant structure of discs and sources that provides solidity to this type of centralized solution.

The SII is working to establish a more solid and efficient technological platform architecture, eliminating components that are no longer functional or using technical support. In the short term, the architecture is as illustrated in Figure 9.

With regard to platforms, the SII has also achieved an advanced level in its DT process,

FIGURE 9

Architecture of the Technological Platform



Source: SII.

Notes: Tax form record system (SIF) (sistema de ingreso de formularios); Modification of representatives (MR); (modificación representantes); Electronic file (EE) (expediente electrónico); Real estate (BBRR) (bienes raíces); Online banking (payment coupon) (BEL) (Banco en línea (cupón de pago); Electronic tax documents (DTE) Documentos tributarios electrónicos; Tax inspection management system (SGF) (sistema de gestión de fiscalización); Internet business start-up (IAI) (inicio actividades internet; Termination of business online (TGI) término de giro internet; Taxpayer start-up registration (RIAC) (registro inicio actividades contribuyentes; Interconnected banking network (RBI) (red bancaria interconectada); Central Bank (BC) (Banco Central); Automated competences center (CCA) (centro de competencia automatizado); Labor Direction (DT) (dirección del trabajo); Self-employed (AUT) (autónomos).

given that it has an updated in-house processing and storage infrastructure; some of its services are on the cloud; it utilizes a single information storage in the form of a data warehouse (DWH); it already has data lake architecture; and it shares information through web services.

2.3. Data (inputs)

The first area of the digital transformation of a TA is its capacity to gather data through digital channels for more complete and efficient use. Ranging from complete taxpayer identification, to recording transactions that determine the amount of payable tax, to the tax return itself, and finally to the payment or rebate of taxes, all of these provide datasets that can, on the one hand, be used to offer better services to taxpayers and, on the other, establish better tax inspections to ensure compliance with obligations. This principles establish the paradigm for the themes described below.

Data policy

Data governance got under way at the SII at the beginning of 2017, with an ongoing program of initiatives that included various projects seeking to introduce best data management practices into the SII. This program was elaborated on the basis of two reference frameworks: the Data Management Association (DAMA) and the Data Governance Institute (DGI).

The SII used a tool to facilitate documentation of data governance and contracted a service provider to support integration of the program and its diverse components. The first phase of data governance was to take place mainly within the SDI itself, and included the following:

- Validation of business rules
- Referential integrity of the databases
- Validation of the types of data prior to implementation
- Analysis of the data in the DWH

The recently implemented program has both a strategic and tactical focus to determine the objec-

tive, scope, and depth of the headings that will be covered by this plan, according to the following:

Strategic focus:

- Create information security policies applicable to the organization, based on the International Organization for Standardization (ISO) standards
- Identify security gaps in technological ambits and in processes
- Conduct internal campaigns to raise awareness about security and cybersecurity
- Coordinate efforts with the Corporate Affairs Division (Subdirección de Asuntos Corporativos) in order to incorporate the “information security and cybersecurity” agenda into corporate policies and guidelines
- Harness the potential of the technical security (Comité Técnico de Seguridad) as a tool for identifying threats and risks
- Establish guidelines for the security configuration of IT tools
- Select new security services
- Help to ensure the availability of business services
- Define security and cybersecurity indicators.

Tactical focus:

- Manage security incidents and coordinate responses with the technological area
- Carry out penetration testing and/or ethical hacking of business systems
- Generate security indicators and metrics, at both the technical and the strategic level
- Define crisis response procedures
- Ensure the permanent availability of business services for both internal use and for taxpayers
- Establish guidelines for the security configurations of the IT tools
- Ensure procurement of suitable suppliers and technology in terms of security services
- Constantly supervise threats and carry out tests

- Publicize and promote preventive education within the institution in terms of information security and cybersecurity
- Define a security framework for the adoption of a public cloud
- Permanently manage security and cybersecurity indicators

In the area of data policy, the SII has made only intermediate progress as, although making a significant effort to institutionalize its data policy and receive the majority of data through web applications, it continues to use *ad hoc* data structures according to the needs of each process. The volume and asymmetry of this practice consumes more resources in the control process and limits the potential for using and exploiting them in tax inspections on a massive scale.

Data quality control

With regard to the data quality control process, the SII employs a best practice that consists in establishing the test plans beforehand, and thereafter constructing the test data to ensure that the functionality responds as expected.

It is worth highlighting that technology exists both for transactional and information back-up processes. There are analytical platforms (Sybase IQ and Cloudera Hadoop) that store information for high-volume analytical processes and are currently utilized to support the analytical processes carried out in the SII, in particular those related with substantial cross-checking of income tax and VAT data. The main databases available to the SII pertain to the transactional systems of:

- Income and VAT returns
- Sworn income tax and VAT returns
- Payment of real estate taxes
- Electronic bills of sale
- Bills of service
- Lines of business and taxpayer economic activity
- Tax password
- Electronic tax documents (ETD), mainly electronic invoices

Figure 10 explains how the flow of SII data functions both internally and externally, as well as the mechanisms by which it shares information through interoperability with other government agencies.

SII follows standards of best practices to ensure data quality by establishing a department responsible for, and specialized in, managing this subprocess. The TA has developed active data quality control processes in its transactional platforms and conducts big and permanent data integration processes to validate data congruence.

Information security

Information security processes require a ICT solution that is robust and, of course, secure. The SII has a network of communications, relying on a clear design, agile implementation, and the necessary scaling-up of the IT platform. The communications architecture is based on a three-layer hierarchical model: access, distribution, and core, as seen in Figure 11.

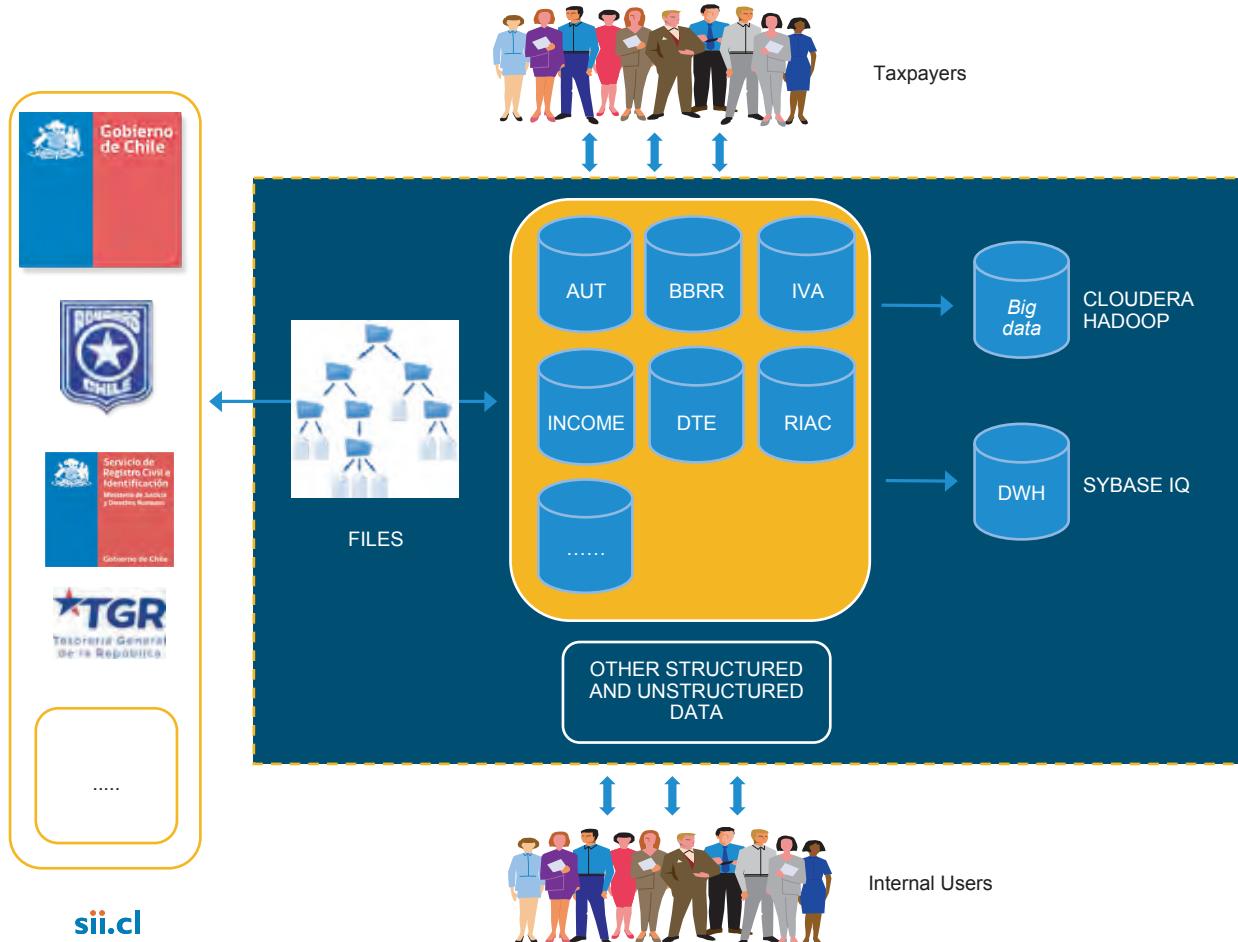
The SII network architecture comprises seven zones of security: a so-called demilitarized zone (DMZ), servers, core, civil servants, local area network (LAN), and wide area network (WAN). The WAN corresponds to the communications infrastructure that provides regional civil servants with connectivity to the IT infrastructure of the SII and the internet. This network is based on multi-protocol label switching (MPLS).

The SII websites are protected with the encryption capacity of the secure hash algorithm (SHA2). The SII utilizes access lists in the border routers and access control through the firewalls to access from the external to the internal networks, and to access the layer of services and the server zones from the DMZ. This operation is carried out in two data centers in active/active mode. The SII manages both, while the externals specialist firms support their infrastructure. As part of best practices in terms of networks, the SII has established the following active processes:

- Separation of production from pre-production environments through sub-networks and firewalls

FIGURE 10

The SII Data Flow



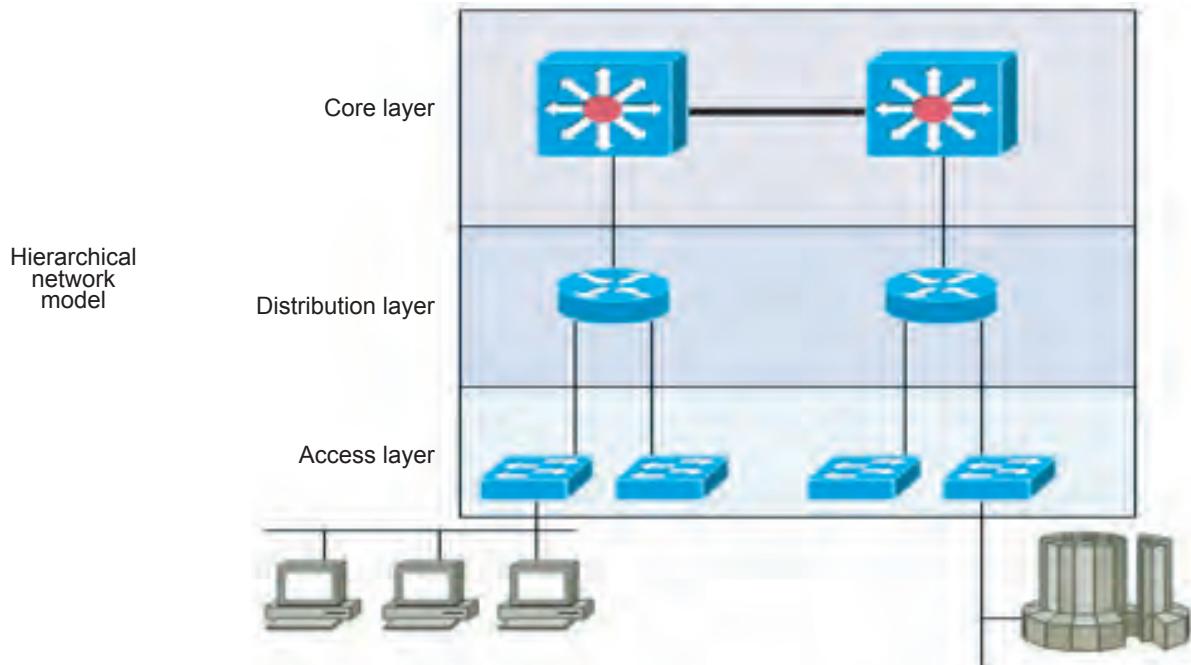
Source: SII.

- Application layer control of access to web services
- Existing security service (anti-spam and anti-virus)
- External attack detection services: intrusion prevention system (IPS) and arbor

The SII is preparing a new integrated policy currently to regulate the allocation of roles for access to and control of critical data. There are also practices in which profiles and roles are defined for the access to and use of critical data. Such profile allocation practices are applied mainly to civil servants who carry out

tax inspections and head offices, as appropriate. Table 8 shows the current policies in the back-up system that operates in the SII technology area.

To foresee natural and social risks, such as those faced recently in Chile, the SII has proactively designed a BCP, which identifies potential impacts that threaten the organization and provides a framework to construct effective responses. This enables the BCP to continue working through unexpected and/or catastrophic events, within the framework of ISO 22301 on business continuity. This is a cross-cutting process that has the following design requirements

FIGURE 11**SII Communications Architecture**

Source: SII.

TABLE 8**SII Information back up**

Type	Name	Validity
BACKUP	Incremental	The last five copies indefinitely; once the file is deleted, one copy every two years
ARCHIVE	PA1M	One month
ARCHIVE	PA6M	Six months
ARCHIVE	PA1A	One year
ARCHIVE	PA7A	Seven years

Source: SII.

- Integrated vision of the processes
- Identification and p
- Prioritization of critical processes
- Identification of key resources
- Mapping of processes and their relationship with technologies
- Establishment of an institutional government model in the face of disruptive events.

To undertake this effort, the SII contracted consultancy services to create a BCP that would comply with the defined objective and that was constructed in line with the premises established by the SII. In particular, the incorporation of specialized support sought to generate knowledge and experience within the institution with regard to business continuity management. The principal

focus of the project, which concluded in December 2019, was to carry out a business impact analysis and identify those sub-processes that were highly critical to the efficiency of the plan. The results showed that, of the total of 36 sub-processes, 19 were highly critical.

Once these sub-processes were identified and their relationship with the technological components that support them were established, the plan prioritized recovery measures to be deployed following the emergence of a catastrophic or disruptive event in its infrastructure. According to the plan, the maximum time for reestablishment of the services associated with the critical sub-processes is eight hours. Within this period of time, the most critical services will be prioritized accordingly:

- 1 hour
 - Operation VAT: declaration of F29
 - Operation income: use of income systems
 - Operation income: tax returns

TABLE 9

Processes and Sub-processes

Process	Sub-process
Assessments	Contributions and reassessments Cartography
Electronic invoicing	Reception of tax documents Inscription in the free invoicing system Issue of electronic tax documents Acknowledgement of receipt or complaint Electronic assignment Electronic document stamping
Income	Income cross checks Use of incomes systems Tax returns
VAT	Elaboration of Form 29 (F29) Online rectifications In-person rectifications F29 declaration
Remunerations	Calculation of remunerations Payment order Record of overtime Calculation of overtime

Source: SII.

- 2 hours
 - Electronic invoice: acknowledgement of receipt or complaint
 - Operation income: cross-checking of income
 - Remunerations: payment orders
- 3 hours
 - Electronic invoicing: issue of ETDs
- 4 hours
 - Electronic invoice: reception of ETDs
 - Electronic invoice: electronic assignment
 - Operation VAT: elaboration of F29
 - Remunerations: calculation of remunerations
 - Assessments: cartography
- 4.5 hours
 - Remunerations: record of overtime
 - Remunerations: calculation of overtime
- 5 hours
 - Operation VAT: online rectifications
 - Operation VAT: in-person rectifications
- 6 hours
 - Electronic invoice: electronic document stamping
 - Assessments: reassessments
- 8 hours
 - Electronic invoice: inscription in the free invoicing system
 - Assessments: contributions

To provide institutionality and monitor the plan, the SII has established a BCP governance proposal which enables it to order and sequence the decisions to be taken in operational terms during execution of the activities established by the BCP. This governance model will manage the following activities:

- Declare the objective and scope
- Integrate and maintain relative documents up to date: business impact analysis (BIA), risk identification analysis (RIA), BCP, operational continuity plan (OCP), technological continuity plan (TCP) and disaster recovery plan (DRP).
- Define the necessary roles and responsibilities. Its structure is the responsibility of:

- A business continuity officer (not a member of the IT team), with a transversal vision.
- A business continuity manager, a business continuity committee with the rest of the SII civil servants.
- Define an annual testing and continuous improvement plan.
- Establish a plan for diffusion and awareness-raising among all SII personnel involved, at least once a year.
- Set a plan for monitoring

The existence of the BCP enabled the SII to react effectively to the challenges posed by the restrictions on movement and the economic downturn that resulted from the COVID-19 pandemic at the start of 2020. It even allowed the Chilean government to entrust the BCP with programs that required a high-capacity information management system to tackle the crisis.

In terms of security, the SII is also following best practices both in policies and procedures to ensure data integrity and privacy for itself and the BCP. Moreover, it has implemented a clear strategy to prevent unauthorized intrusions in the network, with a high level of control of the databases and active monitoring of information traffic and consumption. The border protection systems and application layer are robust and have full traceability. The SII has an information security management system in line with ISO 27001 and ISO 27002 regulations, which promotes a process of continuous improvement.

Taxpayer registration

The SII in Chile classifies taxpayers in its register of the following segments: (i) natural persons, (ii) micro-enterprise, (iii) small enterprise, (iv) medium-sized enterprise, and (v) large enterprise. Each taxpayer can belong to only a single segment, which is determined annually in March based on the information of the two previous business years. To be classified into a particular segment; it is enough for the taxpayer to comply with the necessary conditions. In the case of taxpayers

who are starting activities, their segment is defined when they complete the start-up procedure based on their initial capital, given that such information is incorporated into the MiSii section of the SII website.

In the taxpayer registration process, verifications are made to ensure information integrity. In the case of the SII, such verification is carried out following registration and the start of trading. Coordination between the TA and the civil register is critical for ensuring the uniqueness of the register entries and full taxpayer identification.

In Chile, the civil registration and identification service provides all natural persons, whether nationals or foreigners with residence rights, are given a national identification number (rol único nacional or RUN), provided, which proves their identify to the SII or any other State entity. Legal persons, in contrast, must complete the business start-up procedure with the SII, after which the SII will assign a RUT that serves to identify them to all agencies of the State.

The RUT currently also exists in electronic format, the so-called e-RUT, which replaces the plastic card issued up until June 30, 2016. The e-RUT is a PDF file that can be downloaded from the SII service portal. It identifies the taxpayer, indicating their RUT, name or trading name, main address, and serial number, among others.

Presently, to complete the RUT procedure and to update information in the case of legal persons, the SII requires that all partners or legal representatives be duly registered in the SII databases as natural persons. Moreover, the civil registration and identification service databases verify that the persons therein are adults and still living.

The application for obtaining the RUT contains validations that indicate whether or not that company or entity is already registered. In the event of there being a registration with the same trading or company name and the same start-up date, the application delivers the RUT of the previously registered entity or company and with the same data. As these are commercial companies that have registered their business start-up document in the government gazette (*Diario*

TABLE 10**Evolution of RUT Registrations, 2016–2018**

		2016	2017	2018
Inactive	Large enterprise	682	9	3
	Medium-sized enterprise	221	66	15
	Micro enterprise	538,958	459,209	161,594
	Small enterprise	1,439	496	66
	Natural person	341,299	100,117	11,505
	Total	882,599	559,897	173,183
Termination of business activity	Large enterprise	170	186	177
	Medium-sized enterprise	171	211	163
	Micro enterprise	96,205	57,930	36,621
	Small Large enterprise	1,204	923	659
	Natural person	284,058	133,929	80,666
	Total	381,808	193,179	118,286
Large enterprise	Large enterprise	16,578	16,811	16,704
	Medium-sized enterprise	31,082	32,506	32,749
	Micro enterprise	1,164,436	1,206,519	1,239,160
	Small enterprise	164,472	178,169	185,428
	Natural person	2,629,147	2,769,242	2,715,285
	Total	4,005,715	4,203,247	4,189,326

Source: SII.

Oficial), an electronic verification code is registered, which the application prevents from being entered twice over. These validations avoid double registration. Table 10 shows the evolution of the number of RUT registrations in recent years.

When it comes to taxpayer identification data using the RUT, the SII has achieved an advanced level, given that its system enables it to register online and validate in real time using the civil registration and identification service. The system records information that goes beyond basic identity data.

Electronic invoicing

In 2003, Chile became the first Latin American country to grant legal validity to the e-invoice. Currently, it is being implemented in practically all other countries in the region, with different degrees of penetration. In Chile, all taxpayers must now use the e-invoice. Article 54 of the sales and services tax law (Ley sobre el Impuesto a las Ventas y Servicios) states that the invoices, bills

of sale, invoice settlements and debit and credit notes, which must be issued by taxpayers, will consist exclusively of electronic documents issued in conformity with the law, apart from any pertinent legal exceptions. Bills of lading and bills of sale and services can be issued either electronically or on paper, according to the taxpayer's wishes.

In Chile, the e-invoice is essentially a signed electronic file in XML format, with a validation and authorization scheme prior to operation and issued by the SII. The taxpayers themselves operate the systems when they send, receive, or keep all associated messages, while the SII safeguards and stores this information.

At the beginning of the process, the SII is responsible for assigning tax numbers and authorizing operation of the system, but thereafter acts as a third-party monitor and controller of operational records, to avoid interrupting taxpayer transactions. A tax document would be considered invalid, however, unless sent to the SII systems.

The scheme is based on a digital certificate associated with the natural person. Obtaining said digital certificate is carried out before witnesses. This guarantees complete security with regard to the identity of the person conducting operations in the e-invoice system.

There are multiple issuing platforms, some private and one managed by the TA itself. The only requirement is that every document is sent to the SII in compliance with all the scheme's formats and validation mechanisms. There are currently five private platforms accredited with the ministry of economy and each taxpayer is free to choose the one they find most convenient.

At present, the SII mainly uses information from the e-invoice to elaborate the purchases and sales register of all taxpayers, which must be kept up to date in the TA systems and replaces the old purchase and sales ledgers. This register provides the basis for automatic elaboration of the monthly VAT declaration. Equally, this information is increasingly more important when it comes to massive and selective tax inspections.

Along with the e-invoice there are other ETDs, such as credit and debit notes, bills of lading, exempt invoices, and export documents. More than 1,600,000 ETDs, which are specifically business-to-business (B2B) documents, are issued every day. Between April 2003 and July 2019, 3,722 million ETDs were received, of which 80 percent corresponds specifically to the electronic invoice.

The SII has followed best practices over the more than 17 years since the introduction of the e-invoice. It has been a pioneer in its implementation and mandatory use but is also currently in the process of extending further the use of electronic bills in order to record the totality of transactions through electronic documents. The Chilean system receives electronic invoices with validations of data structure with digital stamp, numeric validations, and metadata attributes, although it lacks predefined data catalogs.

Returns and payments

In Chile, taxpayers provide their periodic information through tax returns that represent more than

95 percent of total tax collection. These comprise fundamentally of VAT and income taxes, although there are also electronic formats for additional taxes on tobacco and fuel, among others.

According to Díaz de Sarralde (2019), in high-income countries (ISORA, all countries) 24.3 percent of VAT returns are received on paper, 2.8 percent through pre-filled means (accepted or to be confirmed), and 69 percent are filed electronically without pre-filling. The CIAT countries receive on average 0.1 percent on paper and 74.7 percent electronically, either pre-filled or partially pre-filled. According to the same report, Chile receives more than 99 percent by electronic means.

According to Díaz de Sarralde (2019), high-income countries receive 17.3 percent of corporate income tax returns on paper and 77.4 percent in non-pre-filled electronic format. The CIAT countries receive 8.1 percent on paper and 83.6 percent in a non-pre-filled electronic format. According to this same source, Chile receives more than 99 percent of its income tax returns through electronic means.

In Chile, tax returns may still be filed on paper, but only in exceptional circumstances. Processing time is approximately a week from the day that the taxpayers enter their data into the systems. Moreover, it is still impossible for the taxpayer accounting systems to connect directly with those of the SII to transfer information automatically.

In terms of payments, the financial system participates through 14 banks in receiving payments, which can also be made online. The process of verifying the payment before accreditation to the taxpayer normally takes two days, which is the period available to the bank to transfer the information to the SII and to the TGR.

Based on Díaz de Sarralde (2019), CIAT countries receive 48 percent of payments online, which represents 60 percent of the value; 32.4 percent of payments are made in-person at the bank, which corresponds to 23 percent of the value; and merely 0.1 percent are made through mobile apps. In Chile, 94.6 percent of payments are made online (94.6 percent of the total value) and 9.3 percent in-person at the bank, which corresponds to 5.4 percent of the total amount paid).

In the sub-component of returns and payments, the SII also deploys best practices, given that it has a system for receiving multi-purpose electronic tax returns and carrying out calculations and validations of data congruence and structure. Moreover, it allows electronic payments to be made via bank portals.

Third party information

Despite the fact that Chile boasts advanced e-governance systems, in which the public institutions can exchange information through digital channels, as well as the existence of a professionalized TA, there is limited access to other sources of information in particular regarding taxpayer bank transactions, even within the framework of the exercise of powers to audit compliance with tax obligations. In this case, the limitation goes beyond considerations of efficiency or any analytical capacities that DT might provide and is linked with the basic capacity of contrasting data from electronic invoices with the financial movements of taxpayers. This is, as yet, an incipient aspect, which signals the need to strengthen the elemental capacity to carry out tax compliance monitoring and management actions.

Furthermore, it is worth highlighting that the current tax legislation empowers the SII to request, in a periodic and structured way, diverse sources of information from public or private institutions. As a consequence, the SII receives 57 tax returns with detailed information per person or enterprise regarding incomes and diverse revenues, such as dividends or company shares, movable assets, salaries and fees, among others, and diverse information on tax benefits, tax credits, donations, income from foreign sources, and so on. Moreover, the SII constantly makes information exchange agreements with other public entities, to obtain the background information needed to carry out or perfect its risk analysis of non-compliance with tax obligations.

Finally, in terms of international information, Chile is part of Action Plan 13 of the OECD's Base Erosion and Profit Shifting initiative (BEPS). In virtue of this, it has been receiving information from the country-by-country (CBC) report since

2018 and, in fact, in 2020 it received information regarding multinational firms from 40 different countries. Equally, the SII periodically receives the common reporting standard (CRS), which provides fiscal information regarding its taxpayers in financial institutions situated outside of the country and that, in 2020, yielded information provided by 79 countries.

2.5. Products and Services (outputs)

Access to information through digital channels represents only half of the TA digital transformation process. The products and services that it can generate and deliver digitally is the other part of this process, which consists in exploiting data to generate information products and services that can help manage the organization more efficiently, provide better services to taxpayers, and increase oversight capacity in terms of proportionality.

Management indicators

Management indicators are an instrument of strategic institutional management. Based on its defined strategy, the SII has a flexible action plan, through which it directs its actions toward a common objective. In this way, operation is aligned with strategy to ensure the tax compliance that constitutes the institutional mission. The flexible time period helps continuity whenever there are changes of administration.

The SII has managed to significantly advance its approach, not only by formulating a strategic plan but also by integrating the tactical returns, institutional mission, strategic map, process map, and annual plan, connecting them all through medium- and short-term metrics. The strategic management cycle includes formulation, alignment (programming and allocation of resources), tracking, and learning. Management monitoring helps to scrutinize the results, analyze deviations, and adjust operations and goals. It is therefore a fundamental element that makes the plan a consistent and dynamic instrument of work, rather than a document to be revised annually or every once in a while.

The SII management monitoring process consists of obtaining data and processing it along with observing the outputs that track the operational results defined in the strategic plan to verify that the direction established by the strategic lines is being followed. The cross-cutting nature of SII management monitoring implies that each business support unit is a source of information within the transversal framework of the process flows.

The balanced scorecard (BSC) is one of the main tools used in the process, providing the basis for the periodic reviews carried out by the senior management team and making it possible to define corrective measures and their subsequent follow-up. The BSC helps to guide management decisions and links operation to strategy. The operation team presents an analysis of the indicators—based on data from the previous month—to management on the 20th of each month. Each division has a counterpart for the purposes of management monitoring. The application helps to characterize a situation through simple and agile visualization mechanisms, which uses a red light to flag alerts and measure the dimension with the specific indicator. This helps in analyzing potential actions, decision making, and implementation of necessary measures.

The SII's balanced scorecard links together financial perspectives, customers, internal processes, and organizational learning. The informa-

tion is incorporated into the company's intranet, which has been live since 2012. There are 50 indicators constructed by the planning department, based on information provided by the systems. The main institution-level indicators are the following:

- Percentage of total effective tax collection
- Percentage of compliance with the number of actions equivalent to in-person controls of the established business
- Percentage of compliance with the number of actions equivalent to selective tax inspections
- Tax inspection pressure on taxpayers classified with a global high or medium risk
- Timely responses to requests for administrative auditing
- Number of taxpayers who attend fiscal education chats
- Percentage of procedures carried out in the SII virtual unit.
- Percentage of taxpayers who had to wait fewer than 30 minutes before being attended in person
- Timely response (1 day) to comments made through the site
- Average number of visits to the site by the taxpayer to complete the procedure

The indicators used in the integrated management balance (Balance de Gestión Integral) in 2018 are detailed in Table 11.

TABLE 11

SII Management indicators 2018

Indicator	Result 2018	Compliance %
Percentage of total effective tax collection	107.2 percent corresponded to the percentage of collection (CLP 34,304,059) in relation to expected revenue.	100
Percentage of procedures carried out in the SII Virtual Unit (Unidad Virtual)	94.4 percent of procedures were conducted by the virtual unit, surpassing the expected value of 84 percent.	100
Percentage of compliance with the number of actions equivalent to in-person controls of the established business.	114 percent of equivalent actions completed in relation to expected in-person controls.	100
Percentage of compliance with the number of actions equivalent to selective inspection.	100 percent of equivalent actions completed in relation to expected selective controls.	100
Overall result		100

The Collective Performance Agreement (Convenio de Desempeño Colectivo) (46 indicators), annual budget plans, and tax compliance management and strategic projects all have their own indicators. The Collective Performance Agreement is another important management tool, described in the section herein on human resources, and whose indicators are part of the planning and management monitoring system. This tool provides an effective element to foster alignment between civil servants and the institutional strategy. This is a formal instrument used by the heads of the State services and the ministry of finance, which prioritizes decentralization and teamwork and is aligned to the strategies and overall goals.

Once the goals have been established, two evaluations are carried out per semester, which include the degree of compliance (real result/promised result) and the degree of global compliance, which is the weighted sum of the compliance with each goal. The incentive received by civil servants in each of the institution's working teams depends on the degree of overall achievement of these goals. For example, a compliance rate of 75 percent may result in a zero salary increase.

In the SII, commitments are subdivided into sub-commitments, which are all assigned indicators, including macro-management indicators that form part of the institutional indicators. Those that contribute directly to compliance with the institutional strategy earn a high weighting. The three major commitments of the 2019 agreement are: (i) to strengthen execution of the tax compliance management plan, (ii) to exploit the potential of making tax compliance easier, and (iii) to improve the quality of the internal support processes. Each of these has sub-commitments and indicators. In the goal monitoring scheme, the expected value of compliance with the annual goals is calculated and detailed information regarding compliance and expected result is published on the institutional website. There are 22 work teams responsible for the commitments of the SII management agreement, including 20 regional offices, the large taxpayer office, and the national headquarters, which all include divisions.

Both the strategic management model and approaches and tools used by the SII place it among the most advanced revenue services in Latin America. Exploiting the following opportunities would further improve its management:

- Review of tax, institutional management, and international indicators—in some cases Chile already reports to surveys such as ISORA—to incorporate them into the SII institutional indicators
- Incorporation of a new framework to measure and act on taxpayer-related objectives, beyond the current survey
- Automatic feeding of indicators from systems to make them permanently available and to facilitate decision-making opportunities
- Review of technological options to optimize integrated and transversal use of indicators to support decision-making.

When it comes to the use of management indicators, the SII has established a good strategic management system that uses a set of indicators largely fed by data provided by its own transactional systems, although a part of the information is still obtained through *ad hoc* reports. For all the above reasons, Chile has reached an advanced level of development in this area.

Services for taxpayers

Between 2009, when taxpayers received services in person in the SII offices or used their personal computers to receive digital services, and 2019, the relationship between the taxpayers and SII has significantly changed with the introduction of the Taxpayer Attention and Assistance Model (Modelo de Atención y Asistencia al Contribuyente, or MACC). Currently, the majority of the interaction is digital, such as through integrated service portals, online help applications, communication using SII-registered email, higher levels of compliance, and taxpayers who generally accept the SII tax return proposal.

According to the SII Public Account (*Cuenta Pública*) report, taxpayer perception is an indica-

tor of management success, mainly in the area of providing taxpayer services. Beginning in 2019, the SII introduced an online survey, conducted by an independent firm, for people who consult or utilize services in person, on the web, and/or through the telephone help desk.²¹ The survey gathers data about satisfaction levels in terms of accessibility, wait times, treatment, usefulness of responses, and solutions, among other areas. These data are consistent with the independent recognition received on May 9, 2020, when SII ranked number one in the public services category in the PXI-Praxis Experience Index ranking, which annually evaluates the experiences of consumers in their dealings with major national brands. For this valuation, the index incorporated 137 brands corresponding to 32 sectors, with a total sample of more than 43,000 surveys taken by daily sampling between March and December 2019.²²

Based on the CADEM survey, SII management approval ratings rose from 35 to 54 percent between November 2015 and May 2019. In the single system for approvals, of the suggestions and complaints submitted in paper form between January and August 2019, 72 percent were approvals, 5 percent were suggestions, and 23 percent were complaints.

Chile enjoys a favorable context for improving services for citizens. On the one hand, there is a demand for high service standards from citizens who are increasingly empowered, sophisticated, and aware of their rights. At the state level, the central administrations have launched initiatives such as the Modernization of the Public Sector Project (Proyecto de Modernización del Sector Público). At the institutional level, the PEI of the SII 2019–2023 gives maximum importance to this matter by including implementation of the MAAC as one of its four main areas. The strategy for the new relationship with taxpayers included in the PEI 2019–2023 has the following objectives:

- Facilitation of tax compliance
- Transversal implementation of the tax compliance management model

- Attention and assistance for taxpayers
- Process-based management
- Creation of the taxpayer experience office management office

As well as focusing on taxpayers, the MAAC incorporates SII civil servants—mainly those in direct contact with citizens—as a critical element for its execution. It seeks to ensure that all collaborators understand, learn, and adhere to the model by putting into practice tools, systems, clear procedures, skills, knowledge, and institutional support.²³

The MAAC is directly related with the progress of digitalization in the SII and presupposes the application of new ITs. Many elements of the model (for example, pre-filled tax returns and sources for preliminary audits) depend on the capacity to design and execute efficient data collection, structuring, and analysis as well as on the design of how such information is applied to service and monitoring.

The importance that the SII puts on its taxpayer services for taxpayers is reflected in the actions taken to improve their experience with the TA, alongside providing assistance to facilitate compliance, among which the following measures are noteworthy:

- **Creation of specialized portals:** tax reform, annual income tax campaigns, electronic invoice, VAT declaration proposal.
- **Segmented and personalized communication:** assistance, VAT, income tax, electronic

²¹In the first semester of 2019, more than 44,000 surveys were conducted to gather taxpayer opinions. Of those consulted, 74.5 percent would recommend carrying out procedures or consulting with the SII. This same response was given by 75.2 percent of those consulted regarding the electronic invoice service and by 74.2 percent regarding income declaration.

²²More information available at: <http://www.sii.cl/noticias/2020/110520noti01er.htm>.

²³Based on the 2019–2023 PEI and the IDB (2019) presentation of the Taxpayer Experience Office (Oficina de Experiencia del Contribuyente).

- tax documents and real estate. Approximately six million emails are sent annually. By 2018, more than 350,000 taxpayers were receiving messages addressed specifically to them.
- **Online help:** applications that support the taxpayer during the tax form-filling process. In 2019, 72 percent of taxpayers used the system and filing of tax returns rose by 13 percent compared with the previous year.
 - **Property georeferencing:** this now covers 78.3 percent of the national real estate register and 94.5 percent of land lots and has simplified and facilitated taxpayer consultations by permitting online access to the rateable value of properties and the amount of tax payable. More than half of administrative rebates and reassessments were managed electronically through MiSII.
 - **Redesign of the taxpayer experience via the in-person channel:** this includes standardizing in-person customer care in the office, improving customer flows, incorporating inclusive help desks, ensuring more friendliness and comfort, and providing a more satisfactory experience.
 - **Self-service tax modules:** for carrying out procedures online in municipalities and public places with a high number of taxpayers.
 - **Mobile SII:** vehicles equipped to assist taxpayers to complete general, tax and real estate procedures and assessments in remote places. Currently available in seven regions.
 - **Guidance and assistance during income declaration periods:** in 2019, there were 30.7 million visits to the operation income information portal.
 - **Help desk:** support or guidance by telephone or through the website with systematized, clear, and timely responses dealing with queries about tax or navigation of the SII website. Telephone contacts represented 96 percent, while website queries accounted for 4 percent.
 - **Tax collaboration agreements:** made with professional, business and social organizations and nationwide agreements.
 - **Web system for municipalities:** to provide information about new buildings and/or building extensions carried out in their communities.
 - **Training for SII civil servants:** in matters of taxpayer service and customer care and for participation in service redesign. In 2019, the taxpayer experience management methodology was prioritized, which meant that 45 awareness-raising workshops were held, and support provided for 32 head offices and business area professionals and 984 civil servants.
 - **Training for taxpayers:** different training modalities and access to information are offered to help citizens to fully comply with their tax obligations so that, for example, they are aware of their obligations, the services available, how to complete procedures and the tax advantages open to them. This is carried out both through in-person events at the Tax Training Center (Centro de Formación Tributaria) and, from 2017 onwards, also by web conferencing. Moreover, information is permanently available on the website to inform and build taxpayer capacity. Between 2016 and 2017, 75,000 taxpayers and 14,000 accountants and financial advisors received instruction (SII, 2018).
 - **Attention to information requests by taxpayers:** under the transparency system, 100 percent of information was delivered in 2018. The MAAC initiatives are the following:
 - Standardization and homogenization of in-person care for taxpayers, according to office size and customer flow to improve the taxpayer experience.
 - Incorporation of the taxpayer experience management methodology into new processes (automation and digitalization of procedures, integration of areas and services, specialist civil servants providing instruction for taxpayers within a friendly customer care framework).
 - Creation of a panel of experience indicators to monitor evolution of the taxpayer customer care model.

- Integrated system of management, tracking, and response to complaints, suggestions and compliments.
- Training for key SII civil servants in application of the MAAC.
- Creation of regulations associated with the MAAC.
- Evaluation and redesign of the system of taxpayer skills training, by applying the experience management model.

One significant characteristic of the SII regarding the design and implementation of the MAAC is the interrelationship that exists between its strategic areas. The MAAC classifies its 5.3 million taxpayers as being of low risk (89 percent), key risk (3 percent), medium risk (7 percent), and high risk (1 percent) in order to design actions to treat each type of taxpayer. While transversally incorporating risk management and profiling, in which the sector, type of society, tax regime, infractions, and so on, are all included. The integrated application of process-based management is also noticeable, through improvement of user experience through the different units that participate in each process that is redesigned and to which the new approaches are applied.

Focus on people

Civil servants and taxpayers are enabled to interact fully in tax processes. Moreover, the opinions of both groups are sought through surveys and other mechanisms that evaluate the services provided through surveys and other instruments.

Focus on “journeys” and processes

The SII identifies, designs, prototypes, and implements service “journeys” in high impact processes to turn them into a satisfactory experience for taxpayers and collaborators. In 2019, 14 service prototypes were tested with civil servants and taxpayers, 12 initiatives were executed related with three processes—business start-ups, income, and auditing—as well as the application of the Sanctions and Waivers Plan (Plan de Aplicación de Sanciones y Condonaciones) of the Legal Division

(Subdirección Jurídica), which had an impact on 20,000 taxpayers, and the termination of business activity of the Taxpayer Assistance Division (Subdirección de Asistencia al Contribuyente), which had an impact on 78,000 taxpayers. Of the 10 of the journeys measured from 2019, 61 percent were satisfied and 64 percent said that they would recommend the SII.

Focus on user experience design

Taxpayer services lead the process of change management in terms of experiences that facilitate informed tax compliance, since they are available to the taxpayer throughout the entire tax cycle. In the unit responsible, there are specialists in the design of user services who seek continuous improvements of processes and experiences, including the different channels through which the relationship with the taxpayer is established. Some examples of these experiences are the following:

- 100 percent of the administrative repeat tax assessments in 2018 were resolved.
- Clear and timely information, support, guidance and accompaniment to resolve differences.
- Reduction of the time spent in filling out forms: Form 29 was 60 percent faster and the Purchases and Sales Register was 70 percent faster.
- Paperless service for DT. Less than 15 percent of bills of service are completed on paper. This implies a saving of US\$1.1 million in bills of service and of US\$1.4 million in tax assessment letters.
- Easier error reporting by taxpayers. They can send reports, background, photographs and georeferencing, and follow-up is provided.
- Involvement of citizen and students, entrepreneurs, and innovators in managing the SII Tax Hackathon of Latin America.

Focus on measurements and indicators

The experiences of taxpayers and civil servants should translate into information and indicators

for decision-making. Some examples are the following:

- Survey of experiences from 10 “journeys” in 2019.
- Studies for determining, listening to, and understanding the needs and expectations of taxpayers and civil servants.
- Single system of approvals, suggestions, and complaints.

Taxpayer services in Chile are mainly offered through digital channels and by exploiting existing data. The majority of procedures can be carried out point to point, while physical attendance at SII offices or the use of paper is required only exceptionally. In this area, Chile is considered to have achieved best practices level.

Integrated service and mobile applications portal

The SII has progressed from information portals for electronic invoicing and tax reform to service portals with segmented messaging and personalized email warnings. MiSII is a portal offering personalized information and services for taxpayers. In comparison with the CIAT countries presented in the 2019 ISORA report (Díaz de Sarralde, 2019) on the provision of electronic services, only Argentina, Brazil, Chile, Spain, Peru, and Portugal provide information and tools on the government website, integrated taxpayer accounts, online services, electronic invoicing, digital mailbox and mobile applications.

Taxpayers can access MiSII is available through the SII portal using the RUT and a password. This enables a simple relationship between the TA and taxpayers through which the latter can both provide and access all their information and use the online tax services. This includes reviewing personal taxpayer information, obtaining further information, receiving support for specific processes, completing procedures, and complying with tax obligations (data, tax situation, characteristics, companies, returns, real estate, authorized documents, correspondence, notifications,

messages and files). This space can also be used to request information under the Transparency Law (Ley de Transparencia) and access informative services, such as tax education, statistics, e-RUT services, publication of invoices, and tax reassessments, among others.

Taxpayers can access MiSII from different devices, as it is adaptable and working to achieve a more modern and intuitive design, with more symbols, less text, and functions to adapt it to taxpayer preferences. Social networks (Facebook, Twitter, and so on) have also been integrated.

Mobile applications (apps) represent an increasingly frequent channel for taxpayer service provision and, in this respect, the SII has also made significant progress. The following apps are currently available:

- E-renta (e-Income): consult, accept, and pay income tax; manage pension, tax rebate data, etcetera
- e-IVA (e-VAT): consult, declare, and pay the monthly VAT quota.
- E-reavalúo (e-Reassessment of properties): find out fiscal values, get information about contributions
- e-boleta de honorarios (e-bills of sale): see the annual report of documents issued, query certain bills, make verifications
- e-factura (e-electronic invoice) (e-tax documents) generalized in 2018: accompany taxpayers through workshops and mass informative emails
- e-RUT (electronic identification): can be generated and stored in the app and obtained online
- e-boleta (e-bills of Sales): issue electronic sales and services bills

In 2019, there were 1,688,835 downloads of SII applications. According to the CIAT report, based on ISORA 2019 (Díaz de Sarralde, 2019), online applications in Chile represent the main channel of taxpayer registration with 88.3 percent of registrations compared to in-person registrations of 11.8 percent. This shows a notable difference with

the high-income countries among all ISORA participants, which carry out, on average, 51.7 percent of registrations via apps compared to 43 percent through traditional channels. The CIAT countries carry out, on average, 46 percent of registrations through apps and 28.5 percent in person.

MiSII, as the integrated services and mobile applications portal of the SII, can be considered to comply with best practices in the use of personalized taxpayer data to offer transactional services from a platform available from any digital device. MiSII is one of the most comprehensive tax portals in the region, which integrates practically all of its digital services.

Pre-filled return

In contrast to the section on tax returns and payments in the data section, where the emphasis was placed on the channel whereby the TA received data provided by the taxpayers when they paid their taxes, this section analyzes the use of data to provide an information service that facilitates compliance with obligations and, at the same time, permits the TA to carry out timely and preventive monitoring actions. The treatment of VAT is one of the most representative signs of progress toward digital tax administration: online tax return proposals, with pre-filled information based on data taken from the TA databases. These tax returns may be completed or modified by taxpayers in respect to the principle of choice.

In 2019, 92 percent of taxpayers used the declaration proposal. This figure includes 93.7 percent of those who declare debits or loans, which amounts to more than 90 percent of the total of the VAT declared. It is worth highlighting that, in 38 percent of cases, the taxpayer fully accepts the tax return proposal without any further changes.

Chile also makes an annual income declaration proposal available for natural persons. In 2019, 3,781,387 taxpayers complied with their declaration, 2.2 percent more than in 2018. The tax returns increased by 13 percent and 86 percent of taxpayers used the proposal pre-filled by the SII. For this purpose, 72 percent of taxpayers used the online assistants (applications to

support the form-filling procedure). The platform was awarded a rating of 6.3 out of 10 by its users.

In terms of tax returns and payments, Chile stands out and achieves the level of best practices, above all with the VAT declaration proposal. This form validates online aspects of format and consistency of inline information, as well as verifications of congruence with information held in the databases. The values of the codes that the taxpayer must declare are determined based on the information available in the Purchases and Sales Register.

Risk management and compliance monitoring

The SII has moved from applying risk management in its auditing activities and using technology to detect and sanction, to a sophisticated preventive approach that involves creating a tax ecosystem that comprises global connectivity, digitalization, collaboration and information management. As well as applying algorithms when taxpayers file their tax returns, this system uses big data tools and advanced analytics to carry out cross-checks and analysis for the differential treatment of taxpayers according to their tax behavior through its risk assessment plan (50.2 percent low risk, 9.9 percent medium risk, 34.5 percent key risk and 5.3 percent high risk), and monitoring to reduce illicit trade and tax evasion.

The risk-based management model is comprised of structural actions such as tax return proposals as well as preventive actions that help to remind taxpayers of obligations and enforce compliance. These actions are complemented with mass cross-checking processes for tax declaration information, in which compliance is verified using different sources of information provided by firms or public or private institutions, or the SII's own information.

Irrespective of the fact that a return proposal makes it easier for taxpayers, the F29 represents one of the most efficient actions for ensuring correct compliance with obligations. The SII takes the initiative with an online proposal for taxpayers, the F29 with its pre-filled values of the

monthly codes they must declare, leaving the taxpayer with only a limited function of verifying the information, as previously commented.

The F29 helps reduce the number of reviews caused by inaccuracies between different sources that, at the end of the day, are errors of information, and allows the SII to program tax inspection actions on a more solid basis without depending on the taxpayer to deliver information from the Purchases and Sales Register, which is currently compiled by the SII itself.

Furthermore, the tax compliance control model includes public information services to verify taxpayer behavior. An option on the SII website can be used to consult the tax situation of third parties. Through this option, information is provided to taxpayers about their tax situation, to make them aware of their current state at the time of the query and of situations that need to be addressed. At the same time, the website can warn people who are doing business with taxpayers with dubious tax behavior. According to the taxpayer's status, the response generated includes a description of the situations that affect them, as well as recommendations or warnings derived from their position.

Authorized documents can also be consulted. This option helps check whether the number of a certain document issued by a taxpayer is found on the list of numbers authorized by the SII (for both stamped and electronic documents). Unless a document is authorized by the SII, it cannot be used to back commercial transactions. In the event that an unauthorized document is included in the accounts, the SII can reject it, by objecting to the corresponding use of the fiscal credit from the Sales and Services Tax and/or for imputing the aforementioned document to costs. This is apart from any fines to which the operation may be subject.

A further element was introduced to the risk management model in 2015, through the Tax Compliance Management Plan (PGCT), published annually by the SII to explain its priorities in terms of proportionality in each exercise. In this way, taxpayers are encouraged to comply with their

tax obligations preventively, thereby reducing the gaps and risks of non-compliance. The PGCT 2019 contains a significant preventive component.

Every year, the PGCT addresses the diverse behaviors or schemes of risk to be tackled and the program of audits is defined according to available capacities, resources and needs. As result of classifying and consolidating problems, the prioritization process defines, as well as the taxpayer risk classification, the tax treatment to be applied, among other elements. This consolidation and combination of problems determines the issues to be addressed. The definition of the risk will also determine the scope. The organizational structure and the prioritization and consolidation process determine the modality (in-person, remote, or self-service) and the channel (website, office, field, mail, or telephone).

Risks, by definition or construction, generally point toward a specific segment of taxpayers. Nonetheless, some risks by their very nature cut across various segments. During the programming process, all available sources of information that were deemed necessary in the risk characterization or analysis process are verified. Much of the information is found in the analytical databases and a smaller percentage in other random sources. Depending on the type of technique used, the complexity or comprehensiveness of the verifications will change in turn. It is also true that the construction of a data set will always be required, whose attributes will depend on history, knowledge of the phenomenon, the creativity of the team in charge and the data management methodology applied.

The risk analysis process begins with a process of characterizing the phenomenon or conduct through descriptive statistics that can identify taxpayers, taxes, obligations, non-compliance and causes. Thereafter, the phenomenon is modeled using a broad spectrum of techniques depending on the information available, its quality, knowledge of the phenomenon, the team's own experience, the time available and other factors, such as technical feasibility. Finally, business rule-based criteria (supported by expert knowl-

edge), more sophisticated algorithms and data mining techniques are applied. It is worth highlighting that risk analysis is not necessarily oriented toward selecting cases for auditing but rather to understanding patterns that help to guide tax compliance management strategies and efforts, such as diffusion, assistance, communication, and preventive actions.

With regard to intelligence activities, there is no specific area for this in the SII, and the function is decentralized in various areas. In particular, the Tax Audit Division (Subdirección de Fiscalización) carries out intelligence activities focused on taxpayer risk. The Legal Division Department of Tax Offences (Departamento de Delitos Tributarios), conducts intelligence activities aimed at detecting tax offences. For its part, the Strategic Management and Tax Studies Division (Subdirección de Gestión Estratégica y Estudios Tributarios) also conducts specific analysis to support monitoring actions.

Finally, external sources of information are also employed in risk control and management processes, which are requested from different institutions, whether public or private, through tax returns, payrolls and information exchange agreements. It is important to stress, however, that in Chile there is no automated and permanent access to a taxpayer's bank information, even during a tax inspection process. This shortcoming, beside any gains in efficiency and fiscal presence that might be obtained by systematically incorporating this information into risk models and cross-checking with information from electronic tax documents, hampers verification of the veracity of information provided by the taxpayer to the SII. This is a structural deficiency in a data-based organization, in which the veracity of the information does not have a solid source of validation.

In Chile, tax rebates (payments) are made by the TGR, which are generally carried out by automatic electronic transfers. Tax rebates administered by this service are governed by overall risk and the specific risk of each taxpayer. Certain control actions withhold the rebates requested,

whether arising from operating income, export VAT, VAT taxpayer change of status, etc, according to the estimated risk for the taxpayer or the economic sector, among others. Therefore, rather than an annual reimbursement plan, a plan exists that deals with withholding tax rebates.

Outstanding taxpayer obligations may be liquidated by withholding tax rebates, but this depends on the nature of the taxpayer and on the exact time in which they are obliged to declare and/or pay. Furthermore, the TGR may withhold tax rebates to compensate for the debts of taxpayers, whether arising from taxes or others stipulated by law, such as alimony, university credits, and so on.

According to the Chilean Tax Code, coercive debt collection actions are also outside the SII's remit and fall within the framework of TGR actions. For many years, the most common way of enforcing compliance by taxpayers persistently reluctant to pay their tax arrears was mainly by embagoing motor vehicles and real estate.

Tax collection in Chile for the year 2018 reached CLP 34.3 billion. Of this sum, CLP 2.8 billion came from the payment of tax debts (8.2 percent), of which CLP 0.9 billion (2.6 percent) (CLP 900,000 million) arose from the payment of debts that originated in control processes. The difference corresponded to debts generated by the actions of the taxpayers themselves, such as debts originated by termination of business activity, deferral of VAT payments or deferred income tax payments, among others. In general terms, over the year 2018, 76.8 percent of fiscal debts were recovered. The debts recovered from control actions alone represented 58.1 percent.

The tax compliance management model in Chile has a strong component based on transactional data. The SII receives information through digital channels through electronic tax documents, which enables it to carry out oversight actions in the form of tax return proposals with pre-filled codes and a Tax Compliance Management Plan that is constructed on the basis of risk models that exploit all available information backed by the expert knowledge of auditors.

BOX 4**Form 29: VAT Return Proposal**

F29, which the SII places at the disposal of taxpayers via Internet, with the proposed values of the monthly tax codes they should declare, is a case of success in terms of digital transformation of the TA. This form has different validations applied immediately online at the moment the taxpayer files the declaration, which may be either of format, inline, or verification of the information held in the databases.

The values of the codes the taxpayer must declare is determined essentially from information available in the Purchases and Sales Register. Taxpayers may review the values determined in their F29 and, if in agreement, accept the proposal and file the tax return. If information from codes that are not proposed by the SII is needed, the taxpayer can enter them and send the declaration with the complementary information. The registration number used by the F29 in the month of August 2019 was obtained from the ETDs listed in Tables 12a and 12b.

TABLE 12A**Register of Purchases**

Document	Quantity
Electronic taxable invoice	30,723,435
Electronic credit note	3,400,446
Electronic exempt invoice	1,902,273
Electronic purchase invoice	183,292
Other documents	215,673
Monthly total	36,425,119

TABLE 12B**Register of Sales**

Document	Quantity
Electronic bill	1,787,900,105
Taxable bill	273,543,333
Electronic receipt	37,205,519
Exempt bill	31,744,139
Electronic taxable invoice	31,358,473
Electronic exempt bill	15,869,836
Electronic coupon	7,153,374
Electronic credit note	3,766,035
Electronic exempt invoice	1,933,022
Other documents	5,638,454
Monthly total	2,196,112,290

The F29 is addressed mainly to taxpayers liable to VAT and, depending on the taxpayer's operations, can offer them all or some of the codes they need to declare. The return proposal model has been available since August 2017, for both on-time and overdue tax returns. It is a simple and personalized process (the application identifies the type of taxpayer and sends it to its navigation flow), which facilitates compliance, provides certainty about information, and reduces sub-declaration and non-declaration gaps.

3

Conclusions

Chile has long been characterized by its professionalized public administration and as a pioneer in implementing cutting-edge public policies. Digital policy and digital government development have not been an exception and the country has advanced significantly in the digital transformation of its TA. The first steps date from 2001 with the pre-filled annual income declaration and 2003, when the electronic invoice was introduced, much before any other Latin American country. Since then, Chile has progressed and currently boasts one of the most advanced mechanisms for presenting monthly VAT returns through its F29, which offers the taxpayer a pre-filled information format based on the purchases and sales register, at the same time, is integrated with the transactional information provided by electronic invoicing.

3.1. Digital Maturity Index: Summary of Results

Based on the information presented and analyzed in the second and third part of this paper, the SII's level of maturity was assessed in terms of the four dimensions included in the matrix: (i) digital ecosystem, (ii) resources for DT, (iii) data (inputs), and (iv) products and services (outputs). For the case of Chile, an advanced level was observed in the digital ecosystem and in resources allocated

to DT, as well as in service provision through digital channels and the use of information for massive control of tax obligations.

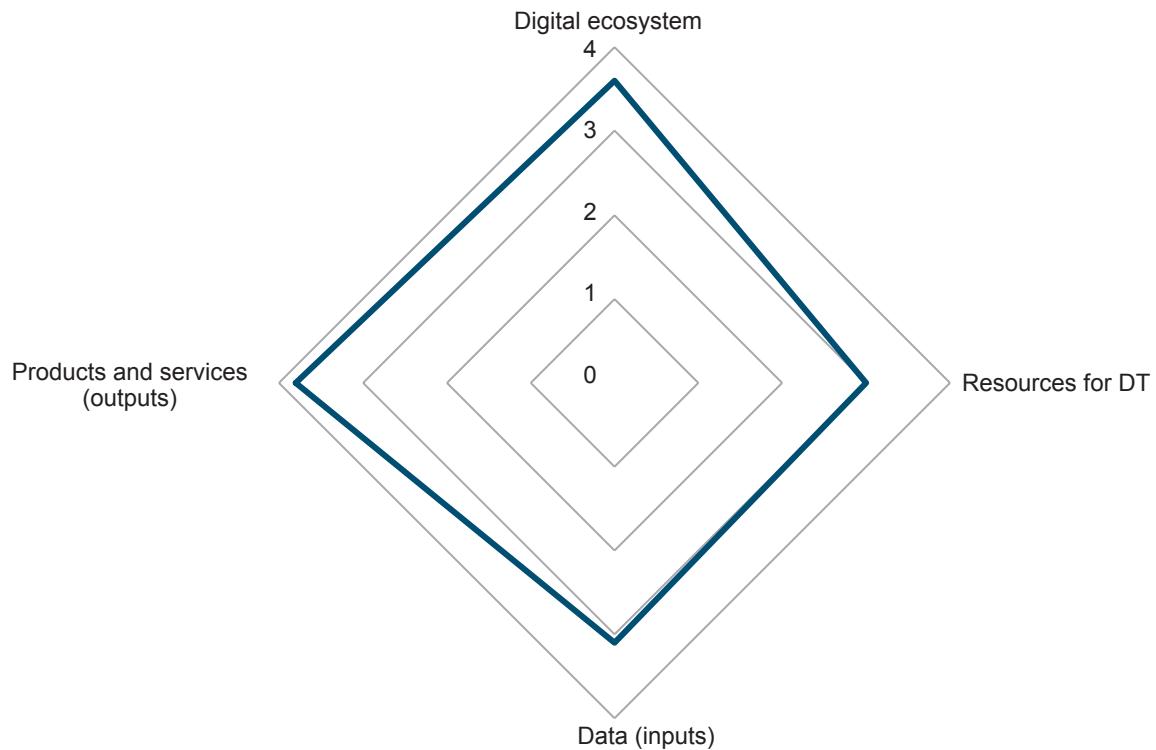
The dimension in which there is room for improvement is found in the SII processes for receiving information, fundamentally due to the lack of an agency responsible for data policy and to the lack of access to financial information through digital channels. To establish a numeric scale for evaluating the TA's level of maturity in its DT process, the following system of scoring was considered according to the evaluation criteria established for each component:

- Best practices = 4 points
- Advanced = 3 points
- Intermediate = 2 points
- Incipient = 1 point

The rating for each component is simple numeric average of the sub-components that comprise it. The radial diagram below reveals the analysis results for the SII.

3.2. Lessons Learned

For more than 15 years, the SII in Chile has been a TA pioneer in terms of digital transformation and is currently one of the most advanced in Latin America. Its experience yields lessons that may be

FIGURE 12**SII Level of Maturity**

Fuente: SII.

TABLE 12**Allocation of Scores**

Dimension / concept	Determined level	Points
1. Digital ecosystem		3.6
a. NDP	The country has an NDP, a digital government strategy, but no data-sharing strategy.	3
b. Degree of access to Internet	More than 90 percent of inhabitants.	4
c. Public sector digitalization policy (electronic government)	A policy exists and is operational but the organizations fail to collaborate effectively to achieve digitalization.	3
d. The TA's leadership in DT	The SII is leader in digital innovation in the public sector and at the national level.	4
e. Digital identity	Digital identity is accepted and advanced and can be used for purposes other than for the SII. Digital certificates are issued by entities authorized by the Ministry of Economy and recognized by the SII for ETDs.	4
2. Resources for DT		3.0
a. Governance	The IT Divisino reports directly to the head of the SII, is part of the management committees and participates in the design of initiatives to improve business processes.	3

(continued on next page)

TABLE 12 (continued)**Allocation of Scores**

Dimension / concept	Determined level	Points
b. Human resources	Recruitment regulations and practices enable the SII to hire with suitable resources in the quantity and quality sufficient for its functions. Salaries are competitive, but the processes are slow and ideal human resources are not always obtained.	3
c. Goods and services financing and procurement policies	The SII has a source of financing that depends on the budget cycle, and it lacks a specific legal framework for procurement and IT investments.	3
d. Strategic planning	The SII has a PETIC that is well aligned with the PEI, as well as a Computing Committee (Comité Informático) with six divisions presided over by the Commissioner and a Committee of Processes (Comité de Procesos) to provide governance for the DT process. Only the SDI intervenes at the data level, but this is not institutional.	3
e. Functional integration of systems	The SII mainly has integrated systems, agile development and support methodologies (internal or external) and utilizes bus-type data architecture for shared services and uses Java or a similar language. The information is generated by tax or business silos.	3
f. Technological platform	The SII mainly has current, on-premise processing and storage infrastructure, it uses some public cloud services, it has a single storage in the form of a DWH or data lake architecture and diffuses information through web services. Furthermore, it has advanced integration with API-type services. The SII has a private cloud solution and high-end servers.	3
3. Data (inputs)		3.1
a. Data policy	The SII has a data policy that, although not formalized, establishes general governance and control guidelines and mechanisms (in process).	2
b. Data quality control	The SII has active data quality control processes in its transactional platforms and conducts data integration and congruence processes. There is a specialized department.	4
c. Information security	The SII has a strategy to prevent unauthorized intrusions in the network, with control over databases, active traffic and information consumption monitoring, border protection and application layer systems, full traceability and with an information security management system, following guidelines of the ISO 27001 and 27002 regulations.	4
d. Taxpayer registration	The SII has an updated system for the registration and updating process, either in-person or online, which registers attributes of information additional to the basic data.	3
e. Electronic invoice	The SII has established the mandatory use of the electronic invoice, has a centralized or decentralized system for receiving and issuing electronic invoices with validations of structure and digital stamp, but lacks defined data catalogs. It employs numeric validation, as well as attributes for metadata. A project to introduce a cloud-based electronic bill is underway	4
f. Tax returns and payments	The SII has a system for receiving electronic multi-purpose tax returns, making calculations or validations of congruence and/or structure according to the data and for making electronic payments from bank portals.	4
g. Other sources of information	The SII does not have the power to request banking information.	1
4. Products and services (outputs)		3.8
a. Management indicators	The SII has a system of management indicators that mainly uses data provided from its transactional systems, but some of the information is still obtained through <i>ad hoc</i> reports.	3

(continued on next page)

TABLE 12 (continued)**Allocation of Scores**

Dimension / concept	Determined level	Points
b. Taxpayer customer care	Digital services for the taxpayer are based on processing existing data, customer care channels are online, and communications are carried out mainly by email.	4
c. Integrated service and mobile applications portal	The SII has a digital portal that integrates all its digital services, which is complemented with a wide range of mobile applications.	4
d. Pre-filled declaration	The SII offers pre-filled income and VAT tax returns, which are accepted without changes by taxpayers in more than 30 percent of pre-filled tax returns presented.	4
e. Control of compliance	The SII has risk models and tax compliance control mechanisms based on analytical models using the data available.	4

useful for other TAs in the region. The main theme of the OECD Forum on Tax Administration (FTA), held in Chile in March 2019 was the development of a plan for the digital transformation of TAs by 2030, which established the organizational and technological changes required.

When analysis of the Chilean case began, the different processes and actions promoted in Chile to support the digitalization and interoperability of the different agencies went largely unnoticed. In this aspect, the SII has been a very active agency by facilitating access to data services and assisting in different programs to support the Chilean economy and its citizens in the face of the COVID-19 health emergency, which illustrates the strategic role it can perform in any government that aspires to become data-based.

Digital transformation can include the entire organization

Digitalization efforts in the SII cover the entire organization and digital processes are ongoing in practically all the stages of the tax cycle. This helps to develop a culture among SII personnel that strengthens the drive to use IT in every initiative of continuous improvement and institutional development.

- Registration. The majority of the procedures are now carried out online, except for those that require additional verifications, as in the case of legal persons.

- Issue of electronic documents, including electronic invoices. There is a decentralized process with validations centralized by the TA for VAT-related operations, but not for all operations. Informative returns from operations with third parties were eliminated and this information is currently obtained from the electronic invoice. With this information, pre-filled VAT returns are prepared, as well as tax returns for natural persons.
- Presentation of tax returns and payments. This is mainly now carried out by electronic means for major taxes, although not for all of them. Pre-filled returns in the cases of VAT and income tax for natural persons are worth mentioning.
- Electronic compliance monitoring. There is mass cross-checking with electronic notifications and, although tax collection directly attributable to these processes is still low, it is expected to acquire greater importance in the future insofar as the automated processes mature.
- Audit programming. Practically all the information inputs for programming are accessed by digital means.
- Exchange of information during the audit process. Digital information can be sent and received without contact between the taxpayer and the tax inspector. Remote tax inspections can now be conducted.

- Defense of fiscal interest. Systems are in place to control the flow of work in processes, such as oversight and monitoring of legal actions.
- Debt collection. This is one of the most effective processes, although it is carried out by the TGR, rather than the SII. The embargos of financial assets and the outstanding accounts revealed by invoice information are the most effective mechanisms that explain the recent growth in tax collection.

The IT function must be considered as both strategic and transversal

The importance of the IT function inside the SII is reflected in its organizational structure: the SDI is ranked in the second level, from where it reports directly to the Director, and has a solid staff structure for carrying out its tasks. One of the SII's strategic objectives is to digitally manage high volumes of information, improving its quality to promote compliance with tax obligations through automated processes and electronic channels while, at the same time, integrating its technological services with other institutions.

The electronic invoice, the VAT declaration proposal with pre-filled codes and the SII service portal, which are complemented with mobile apps, form the key areas of the Chilean transformation that places information at its very center. The strategic decisions of the organization have been for many years aimed towards perfecting these key areas, which has permitted progress to be made consistently over time and throughout the entire SII structure.

Talent management must introduce flexible recruitment schemes

Challenges are present in human resources management that relate to the public nature of TAs, due to the excessive regulation to which they are subject. The SII has attempted to introduce elements of labor flexibility, especially into areas such as computing and information management, in which experts and specialists may request different forms of contracts, remote working and work conditions.

In the context of a growing trend towards working from home, workloads within the organization are being evaluated with the aim of maintaining a high level of labor productivity while striving for a healthy work balance for civil servants. Gaps still remain in the SII between the new skills required by a data-based TA and the range of skills found among the current workforces. To close these gaps, the maintenance of attractive working conditions must be ensured while, at the same time, being innovative in talent management to transcend the rigidities imposed by public sector regulations.

Investment in technology must have an autonomous financing mechanism

The progress seen in DT in Chile has taken place despite the limited autonomy enjoyed by the SII when it comes to managing and making decisions about its procurement financing and processes. As with talent management, investments in IT management are subject to the general public sector regime, which often implies that authorizations are required from other government departments.

The budget allocated by the SII to new investments and to technological services is relatively low compared with TAs with similar levels of digital maturity. This, without doubt, reflects the efficiency that the SII has achieved in managing its processes but also demonstrates that it has placed limitations on its capacity to exploit more fully the vast quantity of data that the organization has amassed. For example, the SII currently has no data laboratory and mass data mining is relatively limited in the processes to monitor proportionality in tax compliance.

The electronic invoice must be the key for obtaining data

Chile introduced the electronic invoice in 2003 and its use is now mandatory for all transactions in which the cost must be recorded. This information means that information regarding the main attributes of each transaction can be obtained in real time, and this is currently the main source of data for tax compliance control processes.

Introducing the electronic invoice meant that informative returns of operations with third parties could be eliminated and the SII can now elaborate the Register of Purchases and Sales directly for each taxpayer, without additional requirements. With this information, tax declaration proposals are elaborated with pre-filled codes for both VAT and for the incomes of natural persons.

In Chile, the system of electronic invoicing and billing has been extended, the latter being one of the measures included in the Tax Modernization Law (Ley de Modernización Tributaria). The law makes the electronic bill mandatory from January 1, 2021, and potential users exceed 400,000 taxpayers.

The declaration proposal with pre-filled codes must become the cornerstone of a compliance-by-design scheme

The pre-filled VAT declaration proposal is clearly a case of success that should be replicated by other TAs in their own digital transformation processes. In Chile, taxpayers can easily access a proposal with pre-filled codes and with validations in real time that facilitate the declaration and monthly tax payment, but that also give greater certainty to taxpayers, by minimizing discrepancies between the VAT declaration (F29) and the Purchases and Sales Register. The F29 is elaborated using the information available in the Purchases and Sales Register, which automatically incorporates the electronic documents issued and received by the SII.

As part of the services provided by the SII, taxpayers are able, in a single platform, to issue and receive their tax documents, access their purchase and sales records, access their declaration proposal with or without movements, and pay, rectify or defer payment. The F29 thereby fulfills a dual purpose of facilitating tax compliance while, at the same time, automatically applying proportionality.

New forms of aggressive behavior must be incorporated into control strategies

In the compliance-by-design model, the timeliness and comprehensiveness of the information helps

to determine the taxpayer's obligations based on the transactional information the TA receives the moment the transaction takes place. However, in this model, simulating operations has become the new form of tax aggressiveness to avoid compliance with obligations.

The fight against simulated transactions that generate false invoices has driven across-the-board implementation of the risk management based MGCT, as a work methodology installed in all business areas, which means this type of behavior can be identified and quickly combated before it becomes generalized throughout the system.

In Chile, new taxpayers have been identified who initiate activities with the sole purpose of cheating the taxman and who, once this objective has been achieved, cease their operations. An analysis of the networks of issuers of false invoices detected during 2018 revealed an amount of approximately CLP 26,000 million in unwarranted VAT credits. Over the course of two years, 5,119 undue receivers were detected who were associated with these networks.

As things stand, 100 percent of the invoice issuers who fulfill the risk criteria observed in the cases of false invoices are reported by the SII to the tax offices, and all taxpayers who receive such documents and who repeatedly incur tax gaps and anomalies are inspected.

All taxpayer obligations should be integrated into a single account

The SII's digital transformation vision includes the concept of a services account with automatic authorized payments: in this way, taxpayers would receive on their personal site a summary of their tax obligations with the charge made to this account. To achieve this aspiration, digital interaction both within and outside of the SII must be strengthened, which represents a substantial challenge for the integration of processes and systems, which could have an impact on the current organizational structure.

The task of integrating processes and systems is of enormous magnitude and the SII manage-

ment considers that it would represent the technical pinnacle of future tax administration. On the road to achieving this objective, the SII seeks to ensure its capacity to manage both its own and third-party information, establishing mechanisms that can guarantee its quality and complexity, so that it constitutes the basis for efficient tax inspection and assistance actions.

The efforts made in Chile to improve its processes based on the use of IT have transformed the SII into one of the few TAs in Latin America that has managed to consolidate the use of transactional data, through electronic invoicing, offering a VAT declaration proposal with pre-filled codes in a clear sign of progress towards a compliance-by- design model.

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Annex 1

Matrix of evaluation criteria

TABLE A1.1

Matrix of evaluation criteria

Concept	Incipient	Intermediate	Advanced	Best practices
Digital ecosystem				
National digital policy	The country does not have a NDP.	The country has an NDP that is not mandatory for the TA.	The country has a mandatory NDP, which is integrated with the TA.	The country has an NDP, a digital government strategy and shared data policies.
Degree of access to Internet	Less than 30 percent of its inhabitants.	More than 30 percent and less than 50 percent of its inhabitants.	More than 50 percent and less than 70 percent of its inhabitants.	More than 70 percent of its inhabitants.
Public sector digitalization policy (electronic government)	Inexistent.	Exists, but is not operational and the organizations do not collaborate among themselves to improve digitalization.	Exists and is operational, but the organizations fail to collaborate among themselves to improve digitalization.	Exists, is operational and the organizations collaborate among themselves to improve digitalization.
Leadership of digitalization in the public sector and at the national level	No organization provides proactive leadership to improve digitalization at the public sector level.	Other entities other than the TA are pioneers and innovators in digitalization at the public sector or national level.	The TA is the leader of digital innovation in the public sector.	The TA is the leader of digital innovation in the public sector and at the national level.
Digital identity	The TA does not have digital identity mechanisms.	There is basic digital identity for purposes of authentication in TA procedures.	There is advanced digital identity for purposes of authentication and legal validity in TA procedures.	There is advanced digital identity and its use is permitted for purposes other than for the TA.
Resources for DT				
Governance	There is an IT area, but it is located in the third or fourth level of the organization and does not form part of the management committees.	The IT area has the resources, structure and attributions necessary to address operational needs.	The IT area is part of the management committees and participates in designing initiatives to improve business processes.	All business areas have digital capacities and there are collegiate agencies to govern data and DT initiatives.

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TABLE A1.1 (continued)**Matrix of evaluation criteria**

Concept	Incipient	Intermediate	Advanced	Best practices
Human resources	The human resources regulations and management practices prevent the TA from recruiting suitable personnel in the quantity and quality sufficient for its functions.	The recruitment regulations and management practices make it difficult for the TA to make human resources available for IT functions in the quantity and quality sufficient for its functions.	The recruitment regulations and management practices partially enable the TA to obtain suitable human resources in sufficient quantity and quality for its functions.	The human resources regulations and management practices enable the TA to have suitable human resources in sufficient quantity and quality for its functions.
Procurement of goods and services financing and policies	The TA does not have a specific or own source of financing, or a specific legal framework for IT procurement and investments.	The TA has a source of financing, but it is dependent on the budget cycle and its legal framework for IT procurement and investments is not exclusive.	The TA has a source of financing other than the budget cycle but its legal framework for IT procurement and investments is not exclusive.	The TA has a source of financing other than the budget cycle and an exclusive legal framework for IT procurement and investments.
Strategic planning	The TA does not have a PETIC.	The TA has a PETIC but does not have internal mechanisms for IT and data management.	The TA has a PETIC and at least one operational IT and/or data management mechanism.	The TA has a PETIC and has established and operates IT and data governance and management mechanisms.
Functional integration of the systems	The TA mainly has inherited systems and/or unconnected platforms or applications.	The TA has some inherited systems and/or unconnected platforms or applications, but it has or is in the process of developing integrated, architecture, based on the .Net platform or similar.	The TA account mainly relies on integrated systems, has agile development methodologies and support (internal or external) and uses bus-type architecture for shared services and Java or similar language.	The TA account mainly relies on integrated systems developed in Java, Python or similar, has begun to use microservices architecture and DevOps-type development methodologies and has mobile applications for procedures.
Technological platform	The TA has out-of-date, on-premise processing and storage infrastructure, does not make use of cloud services and does not have a data warehouse.	The TA mainly has up-to-date, on-premise processing and storage infrastructure, does not make use of public cloud services but does have a data warehouse (DWH) or similar.	The TA mainly has up-to-date, on-premise processing and storage infrastructure, makes use of some public cloud services, has a data warehouse (DWH) or data lake architecture and diffuses information through web services.	The TA uses hybrid cloud processing and storage services (public and private), makes use of structured and unstructured data architecture for its data warehouses and has developed API-type for information display.
Data (inputs)				
Data policy	The TA lacks a data policy and does not have a person responsible for information management.	The TA has an internal data policy (non-formalized) and/or not updated, which establishes only general guidelines. There is a person responsible for information management, but their capacity to apply the data policy is limited.	The TA has a properly formalized data policy that establishes general guidelines and governance and control mechanisms. A collegiate agency exists in which the heads of the business areas and the person responsible for IT participate.	The TA has a properly formalized and updated data policy, with an effective and empowered collegiate government agency that establishes general guidelines, control mechanisms and criteria for the use of and access to information at the institutional level.

(continued on next page)

TABLE A1.1 (continued)**Matrix of evaluation criteria**

Concept	Incipient	Intermediate	Advanced	Best practices
Data quality control	The TA does not have a data structure review and/or quality control process for the data it receives.	The TA has some data structure review processes.	The TA has established and periodical structural review and quality control processes, and conducts data integration and consolidation processes.	The TA has active data quality control processes in its transactional platforms and carries out data integration and congruence processes.
Information security	The TA only has basic solutions for preventing unauthorized intrusions in the network.	The TA has intermediate solutions for preventing unauthorized intrusions in the network and controlling its databases.	The TA has intermediate solutions for preventing unauthorized intrusions in the network and controlling its databases and a security management model.	The TA has advanced solutions for preventing unauthorized intrusions in the network and controlling its databases, active monitoring of traffic and information consumption, border protection and application layer systems, full traceability and an information security management system.
Taxpayer registration	The TA has an inherited internal system for the taxpayer registration and updating process.	The TA has an updated system taxpayer registration and updating process, both in-person or online.	The TA has an updated system for completing the registration and updating process, either in-person or online, which records information attributes additional to the basic data.	The TA has an updated system for completing the registration and updating process, either in-person or online, which records information attributes additional to the basic data and carries out validations with other official sources of information.
Declarations and payments	The TA has a system for receiving declarations in digital format.	The TA has a system for receiving electronic declarations (online or through authorized systems) and issues codes for payment in bank branches.	The TA has a system to receive electronic declarations (online or from authorized systems), makes calculations or validations of data congruence and/or structure and issues codes for either electronic payment or over the bank counter.	The TA has a system for receiving multi-purpose electronic declarations, making calculations or validations of data congruence and/or structure and enables electronic payments to be made through bank portals.
Electronic invoice	The TA has not established the use of the electronic invoice.	The TA has established the partial use of electronic invoicing, has a centralized or decentralized system for receiving and issuing electronic invoices without validations of data structure, with and without digital stamp.	The TA has installed majority use of electronic invoicing, has a centralized or decentralized system for receiving and issuing electronic invoices with validations of data structure and digital stamping.	The TA has established mandatory use of the electronic invoice, has a centralized or decentralized system for receiving and issuing electronic invoices with validations of data structure and digital stamping and has defined data catalogues and arithmetic validation, as well as metadata attributes.

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TABLE A1.1 (continued)**Matrix of evaluation criteria**

Concept	Incipient	Intermediate	Advanced	Best practices
Other sources of information	The TA does not have the legal power to request information from other entities that hold it and thereby lacks effective access.	The TA lacks the legal power to request information from other entities that hold it, but does enjoy effective access.	The TA has the legal power to request information from other entities that hold it but either fails to obtain it, or it is difficult to obtain.	The TA has the legal power to request information from other entities that hold it and can easily obtain it.
Services (outputs)				
Management indicators	The TA does not have a transactional data-based indicator management system.	The TA has an indicator management system that uses some data provided by its transactional systems.	The TA has an indicator management system that mainly uses data provided by its transactional systems.	The TA has a indicator management system based entirely on data provided by its transactional systems.
Taxpayer customer care	The TA does provide digital services for taxpayers, with only in-person attention available. Procedures are carried out on paper.	The TA provides some digital services and communication is conducted in some cases by email.	The TA has some digital services for taxpayers based on processing existing data.	Digital services for taxpayers are based on processing existing data, customer care channels are online and communication is conducted through a tax mailbox associated with the taxpayer's registered email.
Integrated service and mobile applications portal	The TA has an Internet portal that offers information but not services.	The TA has a digital portal that integrates some of its digital services, while in-person customer care continues to be predominant.	The TA a digital portal that integrates most of its digital services but has not developed mobile applications.	The TA has a digital portal and mobile apps in which all digital services are integrated.
Pre-filled tax return	The TA does not offer a pre-filled tax return to taxpayers for any of their obligations.	The TA offers some pre-filled fields for the annual income tax returns of natural persons.	The TA offers a full option with all pre-filled fields for annual income tax returns of natural persons and also offers a proposal with some pre-filled fields for VAT declarations.	The TA offers pre-filled fields for income tax and VAT declarations with levels of acceptance without changes by taxpayers in more than 50 percent of the pre-filled declarations presented.
Risk management and compliance control	The TA does not use risk models and or have available data-based tax compliance control mechanisms.	The TA does use risk models but no available data-based tax compliance control mechanisms.	The TA has risk models and tax compliance control mechanisms based on traditional data cross-checking.	The TA has risk models and tax compliance control mechanisms based on analytical models of available data.

Annex 2

Catalogue of SII services, December 2020

In-person services, application lifecycle management

- Initial password
- Providing legal RUT
- Providing RUT to non-resident foreign natural persons
- Start-up businesses
- Taxpayer certificates for assistance services
- Request, consult, and invalidate the electronic RUT (e-RUT)
- Modification of partners and representatives (MSR)
- Administrative requests system (SISPAD)
- Verification of activities
- Termination of business activity
- Certificates to present to foreign Tas
- Declaration of tax on intestate inheritance (F4423)
- Notification of vehicle sales (F1816)

Online services

- Secret password and electronic representatives
- RUT and start up activities
 - Inscription and attainment of RUT number (100 percent online for the following companies: limited liability company, joint stock companies, limited liability sole proprietorship, and close corporation (other

types of companies and/or entities must register in the SII offices)

- e-RUT
- Start-up activities (100 percent online with the exception of foreigners with and without residence, who must accredit their type of visa in person, non-resident entities, and taxpayers who wish to start health-related activities, such as self-employed doctors, dentists, and veterinary surgeons, who must initiate their activities in person in SII offices)
- New system for the verification of activities
- Taxpayer registration modifications (simple and complex)
- Tax regimes.
- Information management
 - Update address
 - Change or expand business or economic activity
 - Add/eliminate branches
 - Update partners
 - Change email and/or mobile telephone
 - Notification by email
- Administrative and other requests
 - Tax regimes (100 percent online with the exception of special regimes, which are dealt with in SII offices)
 - Request for verification of activity

- Request for accounting software
- Certificates for presentation to foreign tax authorities
- Record of request for voluntary administrative appeal
- Record of request for hierarchical appeal
- Electronic invoicing and billing
 - SII free invoicing system
 - Market invoicing system
 - Purchases and sales register
 - ETD consultations
 - Register of acceptance or rejection of an ETD
 - Taxpayer queries
 - Publication of invoices
 - Electronic bills of sale and services
 - Mobile app for bills of lading in e-invoicing
 - Report consumption of ledger pages to the sales register
 - Measures for SMEs
 - e-billing (issue and reception of e-bills)
 - Bills of service issuer
 - Bill of service provision by electronic third parties
 - Pension contributions
- Electronic ledgers
 - Inscription of electronic ledgers
 - Document sending
- Monthly taxes
 - Monthly declaration (F29)
 - Monthly declaration (F50)
 - Purchases and Sales Register
 - Consultation and tracking (F29 and F50)
 - Request for export VAT rebate (F3600)
 - Request for taxpayer change of status rebate (F3560)
 - VAT deferral in 12 quotas
 - Deferral quotas, Law 21.207
 - Digital tax: inscription, authentication, recovery, and change of password and reception of the digital tax declaration form
 - Reception of rebate request form Art. 27 Bis DL 825/74 (F3280)
 - VAT rebate request
- Tax returns
 - VAT tax returns
- Income tax returns
- Stamp and seal tax return
- Real estate tax returns
- Overseas investment register
- Declaration of income
 - Declare income (F22)
 - Correct or rectify declaration
 - Consultation and tracking
 - Declaration of profit transfer agreement for education costs, Art. 55/3
 - Voluntary pension saving bonus
 - Advanced rebate of the monthly pension payment, F1879 proposal (signed declaration of withheld fees)
 - Fiscal cost report
 - Deferral of 2020 income payment
 - Middle-class bonus and loans
 - Payment of subsidy to self-employed workers
 - Payment of subsidy to employed workers and individual entrepreneurs
- Infractions, payment orders, and debt relief
- Termination of business activity (only the second category is available 100 percent online, those in the first category may make the request online, but must present proof documents in person)
 - Declare termination of business activity
 - Consult declaration of termination of business activity
- Tax situation
 - Consult document stamping of documents
 - Review tax situation
 - Electronic tax folder
 - System of document stamping web for bills of sale
- Inheritance and donations
 - Receipt of the legacies and donations form (automation of testate and intestate legacies and donations information)
- Real estate assessments and contributions
 - Consult assessments and certificates
 - Real estate property reassessment
 - Applications for external entities
 - Implementation of an application for paying contributions (e-contributions)

- Work order solver
- Reception via internet, administration, and migration of F2890, alienation of real estate property
- Territorial tax surcharge: issue and notification of surcharges
- Vehicle tax rate

