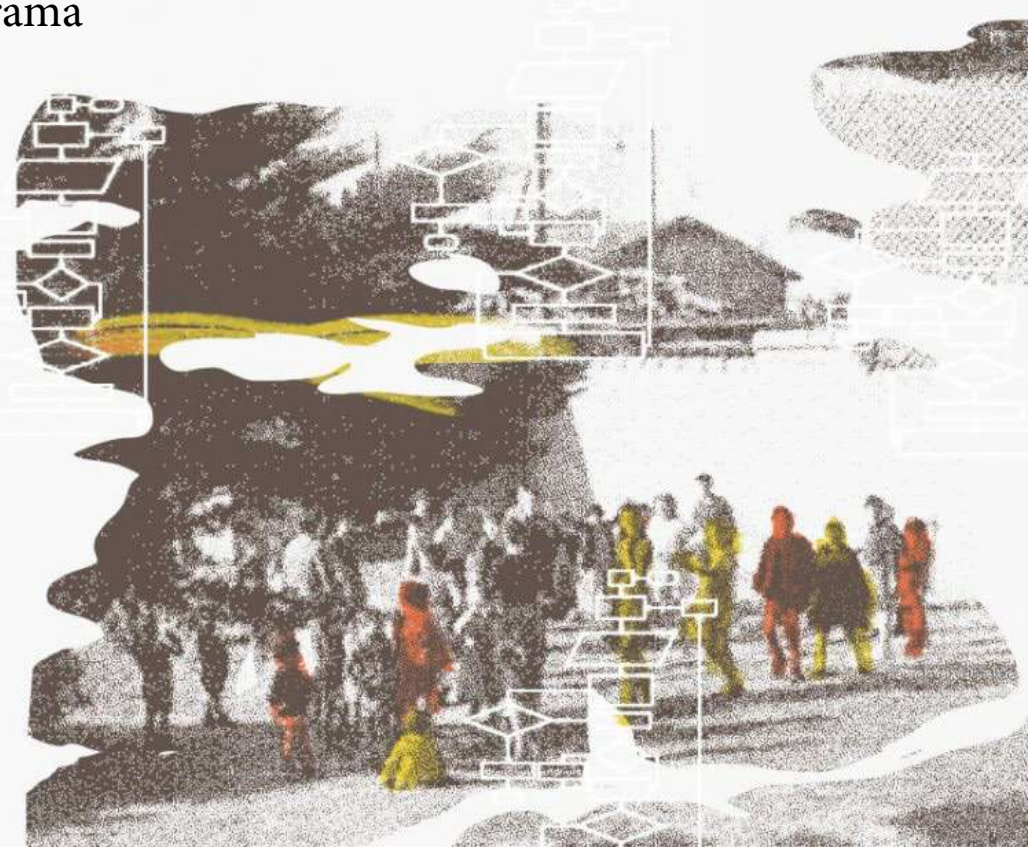
Inteligencia artificial e inclusión en América Latina

CHILE

The Child Alert System

and predicting the risk of violations of children's rights

by Matías Valderrama



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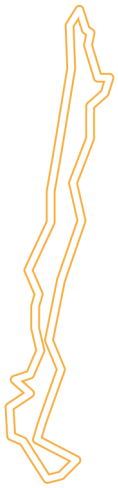

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Since 2019, Derechos Digitales has been part of the IDRC's Cyber Policy Centres, together with leading organizations in technology and public policy issues in the Global South. The report comes under the "Artificial Intelligence and Inclusion" area of work, coordinated by Jamila Venturini, Juan Carlos Lara and Patricio Velasco. For more information on this project, please visit https://ia.derechosdigitales.org/

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Contents

EXECUTIVE SUMMARY

The case studied in this investigation is the "Child Alert System" (Sistema Alerta Niñez, SAN). This is a computer system developed and maintained by the Undersecretariat for Social Assessment and implemented in its pilot form at the Municipal Offices for Children (Oficinas Locales de Niñez, OLN) of the Undersecretariat for Children. Both undersecretariats report to Chile's Ministry of Social Development and Family (Ministerio de Desarrollo Social y Familia, MDSF).

SAN's objective is to estimate and predict the level of risk to children and adolescents of suffering a violation of their rights in the future, using an analysis of data from different administrative sources, to be able to get a step ahead and intervene early for prevention in each case. In practice, the system generates a "risk index" score for each child/adolescent, allowing cases to be prioritized by the Municipal Offices for Children. In addition, the system has been set up as a platform for registering, managing and monitoring the cases of children and adolescents identified as being at greatest risk.

The first part of this study provides information on the country's sociodemographic, regulatory and institutional landscape with regard to artificial intelligence (AI), data and algorithms to contextualize the case study. In the second part, the SAN case is described at a granular level, from the tender process up through the system's implementation at the OLNs.

In tracing the social life of this tool, it is possible to highlight two distinct moments or phases in SAN: a first moment found in SAN's design and development, in which actors from the academic realm in both Chile and New Zealand are involved, showing a strong orientation toward the system's predictive nature. A second moment appears with the integration of SAN at the OLN where the system is mobilized at a community level. During this process, expectations for the system are lowered, with more emphasis placed on its capabilities for registration, management and monitoring of entered cases; SAN's scoring is mentioned as complementary to the information gathered by the OLN in each locality. In a critical evaluation of the case, a series of problematic points requiring attention is presented.

- SAN's development harbored a strong determination of social policy by the technological, which is clearly shown by the sequence of events in which first the system's creation was conceived and then the institutional structure was defined along the way.
- The tender process was geared toward a sole bidder and without setting ex-ante criteria for data ethics, transparency or justice in evaluating the proposals.
- The descriptions given of SAN under the "targeting" heading tend to hide the development specificities of "predictive risk models" and affect any possibility of duly informed consent regarding those specificities.
- Attention has been lacking toward the possible performative role that SAN could have when making contact with families who have not requested government assistance and who could experience the contact as highly invasive of their privacy.
- The "pilot" figure is used to justify the opacity of SAN's operations. The lack of public documentation on the current design and performance of the predictive model is worrying, as is the absence of processes for citizen participation or consultation in SAN's development and implementation.
- By combining information from multiple databases to increase SAN's predictive capability, a clear understanding of the extent and handling of personal data can be lost when it comes to seeking consent. Centralizing and processing sensitive information on children and adolescents in a single computer system becomes dangerous.

- Doubts persist around how the MDSF resolved a series of methodological questions in SAN's modeling process, particularly in terms of which target variable the model presents and how this is connected to OLN guidelines.
- There is a steep socioeconomic slant to both the target variables to be predicted and SAN's prediction process itself. The over-representation of children and adolescents from homes in lower socioeconomic echelons and the under-representation of homes from higher socioeconomic levels is something to take into account if equal treatment at the OLNs is intended.

INTRODUCTION

Artificial intelligence (AI) has again emerged in recent public debate offering visions of prosperity and disaster for societies of the future. Thanks to the growing datafication of contemporary society (van Dijck, 2014; Schäfer & van Es, 2017), each day huge volumes of data are generated in real time on multiple acts, processes and spheres of social life. These data are being collected and repurposed for the training and learning of sophisticated intelligent computing systems. While there is no unanimous understanding of what AI is, it can be preliminarily defined as a computing system that with some degree of autonomy can execute tasks that would be considered intelligent if they were performed by humans, such as classification, pattern recognition, prediction, recommendation and many others (MacKenzie, 2017; Mattamala, 2019). By using diverse computational techniques to process huge databases, these computer systems can assist humans or completely automate tasks, processes and decision-making, in what has been called Algorithmic or Automated Decision Making (ADM) (Rouvroy & Berns, 2013; MacKenzie, 2017; O'Neil, 2017; Crawford & Joler, 2018).

Great concern has been raised recently around the political and ethical aspects of AI and ADM system applications. Together with the strengthening of more invasive and automated surveillance, in both public and domestic spaces (Degli Esposti, 2014; van Dijck, 2014; Zuboff, 2019), the opaque nature of these systems has been questioned, along with the scant capacity to subject them to public scrutiny. Algorithmic systems tend to be "black boxes" that are difficult for users, the calculated subjects or even their own designers to understand (Church & Fairchild 2017; Pasquale, 2015). Furthermore, AI could generate new digital gaps between a majority that generates data and a minority that controls the access, ownership and intelligent analytics needed for processing these data. The latter would manage to leverage the benefits of AI and gain advantages impossible for most people to detect (Andrejevic, 2014; Boyd and Crawford, 2012; Lutz, 2019). This would be particularly important for countries, since it is estimated that AI will increase the gaps between "developed" countries and "developing" ones that have lower digital education and the corresponding infrastructure (Bughin et al., 2018). Moreover, in contemporary AI design there are already significant differences between nations in terms of supply, production and assembly chains for these systems (Crawford & Joler, 2018), increasing asymmetrical relationships between the global North and South.

There have also been questions raised in terms of how AI-based algorithmic predictions can end up strengthening forms of segregation and discrimination based on socioeconomic status, income, race or gender, among others (See Angwin et al., 2016). Although it was thought that these algorithmic systems would be more "neutral" or "objective" than human judgment because they are based on mathematical modeling, different authors have warned that they produce systematic social discrimination via the prejudices of their designers and/or the data used to train the systems (Benjamin, 2019; Noble, 2018; O'Neil, 2017). The algorithmic models could tend to create pernicious feedback loops: by trying to predict where more crime will happen or who will be unable to pay back a loan, they lead to more surveillance, punishment and stigmatization of certain people, groups and neighborhoods in vulnerable situations (O'Neil, 2017). These cases would not be mere failures or occasional mistakes, but rather forms of "algorithmic oppression" (Noble, 2018) that reproduce society's sexism, racism, cis-normativity and privileging of binary gender roles and identity, erasing individuals' agency or even their ability to understand the oppression given the opaque, inscrutable nature of these algorithmic systems.

The possible risks and dangers of developing and adopting AI and ADM systems in government social services are particularly relevant (See Dencik & Kaun, 2020). Recently, there have been high expectations for the application of AI and ADM systems in public services to improve their efficiency, cost and speed. According to Helen Margetts and Cosmina Dorobantu (2019), AI could help to develop more personalized and receptive public services, creating computational simulations to experiment with new measures and

public policies before implementing them, as well as generating novel anticipatory capabilities in governments. This would allow the prediction of future trends or events such as demand for certain basic services, or calculation of certain individuals' risk, to target resources more efficiently. However, beyond these efficiency-oriented narratives, there are significant challenges for State use of AI and ADM systems regarding the over-stigmatization of vulnerable populations, perpetuation of cultural biases and questioning of public trust and legitimacy that must be addressed (Dencik & Kaun, 2020; Margetts & Dorobantu, 2019).

Despite these concerns, and due to the newness of the debate, the introduction of ADM systems in the state apparatus continues to elude critical exploration in Latin America. To fill this gap, we critically investigate the use of ADM systems in public child protection services. In recent years there has been a push to adopt predictive models and analytics in social services regarding child protection in different countries. These systems seek to use complex algorithmic calculations to predict future aberrant events such as the abuse, neglect or death of children and adolescents. These systems produce a risk score that would aid in decision-making by social services, which is generally limited to a binary decision of either investigating or rejecting a case (Cuccaro-Alamin et al., 2017). Previous research into predictive analytics for childhood have raised alarm about inaccurate predictions, lack of transparency in their operations, use of data without effective consent, leakage of personal data, stigmatization of vulnerable populations, a deepening neoliberal rationale in which social problems are individualized, and mandating the provision of social services (Church & Fairchild 2017; Keddell 2015; Redden et al. 2020).

This report studies the design and implementation of the Child Alert System (SAN). This is a computational system implemented by Chile's Ministry of Social Development and Family, which seeks to calculate and predict the level of risk of violating the rights of children and adolescents, to be able to intervene early in the cases at highest risk. The report offers a detailed history of the case, from its design and development through its current maintenance. This report is based on information obtained by request using the Transparency Act and an exhaustive review of secondary documents such as press reports, presentations, tender documents, technical proposals, technical guidelines, reports, public accounting or purchase orders from the Ministry and other agencies. It is important to highlight the difficulties that arose in the research process, in light of the explicit refusal by key actors at the MDSF to be interviewed, and the problem of the lack of public documentation on the current state of SAN's predictive tool now being implemented at the Municipal Offices for Children.

CONTEXT

To provide context for this case study, this section will review data and contextual elements for the country which aid in understanding the implemented system. First, data on Chile's sociodemographic situation and the level of Internet access are examined. Then the country's regulatory context in terms of digital data and algorithms is analyzed. Finally, the Chilean government's institutional structure for innovation and scientific and technological development is described, with special emphasis on the most recent emerging artificial intelligence and ADM initiatives.

Sociodemographic context

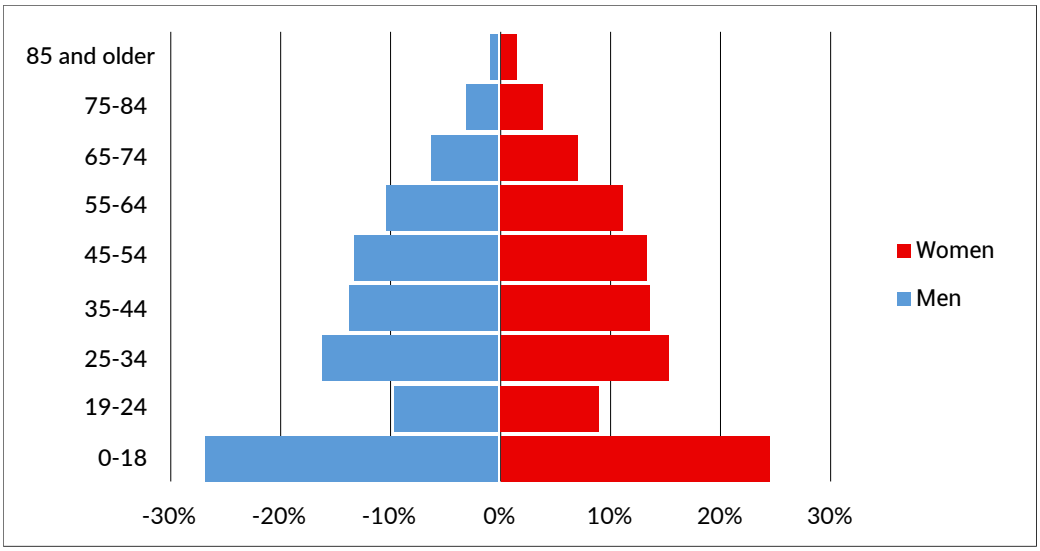
The most current statistics on Chile's population to date correspond to data collected in the 2017 Census. In that exercise, the census population was 17,574,003 people, representing a 1% increase compared to the 2002 Census. This reflects the historical trend of a decrease in the country's growth rate since 1982, when the rate was 2%. "This fact shows that Chile's population dynamic is at an advanced stage of demographic transition, i.e., mortality and birth rates decrease and the population ages, with the subsequent decrease in its rate of growth" (INE, 2018, p. 5).

In parallel, the country has experienced growth among the urban population, though this has been losing strength in recent years. In 1992, the urban population reached 83.5%, then in 2002 it was 86.6% and in 2017 it hit 87.8%. By the same token, the rural population has been decreasing in both percentage and absolute terms. The regions that show people predominantly in urban areas are the Metropolitan Region (96.3%), Antofagasta (94.1%) and Tarapacá (93.8%), Magallanes (91.9%), Valparaíso and Atacama (91%), while the regions with more people living in rural areas are Ñuble (30.6%), La Araucanía (29.1%) and Los Ríos (28.3%). Data further show that the population tends to be concentrated in the large cities of the country's central area. Around 40.5% belong to the Metropolitan region, which points to the country's centralism. This is followed by the Valparaíso region with 10.3% and the Bío-Bío region with 8.9% of the total census population.

Of the total census population, 48.9% are men (8,601,989) and 51.1% are women (8,972,014). This distribution is similar for all 16 of the country's regions, with the exception of the Aysén and Antofagasta regions, where the percentage of men is around 52%. As in other countries, women live longer than men, and the percentage increase of women in the final age brackets can be observed. Examining the age distribution of people aged 0 to 18, the largest group is of people between 25 and 34 years old, which is consistent with the trend toward aging of the population, now concentrated in individuals from middle age groups and no longer at the base.

Figure 1: Distribution by age brackets and sex.

Fonte: Elaboração Própria a partir do Censo de 2017



Analyzing the distribution of age brackets by regions shows that regions in the north of the country present a younger population: around 38% of the group between 0 and 24 years old. On the other hand, in regions of the country's central sector such as Ñuble or O'Higgins, this percentage drops to 33% and 34%, respectively. The population 65 years and older is largest in regions like Valparaíso or Ñuble at 14%.

Figure 2: Distribution by age brackets and regions.

Source: Prepared by authors based on the 2017 Census

	15 - Arica y Parinacota	1 -Tarapacá	2 - Antofagasta	3 - Atacama	4 - Coquimbo	5 - Valparaíso	13 – Metro-politana	6 - O'Higgins	7 - Maule	16 - Ñuble	8 - Bío-Bío	9 - La Araucanía	14 - Los Ríos	10 - Los Lagos	11 - Aysén	12 - Magallanes
0-18	28%	29%	27%	29%	28%	25%	25%	26%	26%	25%	26%	27%	26%	27%	28%	24%
19-24	10%	10%	10%	9%	9%	10%	10%	8%	9%	8%	10%	9%	9%	8%	7%	8%
25-34	16%	18%	18%	16%	15%	15%	17%	15%	14%	14%	15%	14%	14%	15%	17%	16%
35-44	14%	15%	16%	13%	13%	13%	14%	14%	13%	13%	13%	13%	13%	14%	15%	15%
45-54	12%	12%	13%	13%	13%	13%	13%	14%	14%	15%	14%	13%	14%	14%	14%	13%
55-64	10%	9%	9%	10%	11%	12%	11%	11%	11%	12%	11%	11%	11%	10%	10%	12%
65-74	7%	5%	5%	6%	7%	8%	6%	7%	7%	8%	7%	7%	7%	6%	5%	7%
75-84	3%	2%	2%	3%	4%	4%	3%	4%	4%	4%	4%	4%	4%	3%	3%	4%
85 y más	1%	1%	1%	1%	1%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Of the total census population, more than two million people (2,185,792) are considered to belong to an indigenous group. Nearly 80% of these (1,745,147) belong to the Mapuche people, representing nearly 10%

of the total census population. The survey registered 746,465 people born abroad who declared residence in Chile, representing 4.35% of the total population. Eighty-one percent (81%) of international immigrants stating they lived in Chile at the time of the Census were born in the following seven countries: Peru (25.2%), Colombia (14.1%), Venezuela (11.1%), Bolivia (9.9%), Argentina (8.9%), Haiti (8.4%) and Ecuador (3.7%). This migrant population is mainly located in the Metropolitan region, followed by the Antofagasta, Tarapacá, and Arica y Parinacota regions.

In terms of Internet access in Chile, the most common reference is the Survey on Internet Access and Uses (Encuesta de Acceso y Usos de Internet) by Chile's Undersecretariat for Telecommunications. The latest version of this study was prepared from September 7 to October 29, 2017, based on a sample of 3,600 cases.[1] The numbers on access are encouraging. The percentage of households that stated they had their own paid access to the internet was 87.4% of total households. However, delving into what kind of access the households have brings to light important differences: of households with Internet access, 29.6% only have mobile connections, 28.9% only have fixed connections and 27.2% have both fixed and mobile connections for access. Significant differences are also found in the kind of device: nearly 100% stated they accessed the Internet using a mobile phone or Smart phone, but 54.8% use a laptop computer, 22% use a TV and 20.6% use a desktop computer.

According to the study, 89.1% of households in urban areas of the country have their own access to the Internet, while for households in rural areas, this percentage drops to 76.7%. However, compared to the 2016 study, this difference is decreasing as the percentage of households in rural areas with Internet access increases. The regions with the least home Internet access are the Aysén and Atacama regions, with 73.1% and 73.4% respectively. The regions with greatest access are the Magallanes and Antofagasta regions, with 93% and 92.9%, respectively.[2]

Using a per person expansion factor, the study estimates that 86.1% of the population has Internet access. However, the question of Internet access was oriented to households. Another question in the survey asked if in the last 12 months the person used Internet at home, which likewise does not allow adequate evaluation, considering the broad time interval and the nature of the question, which is restricted to at-home use. As a result, the vast majority of people surveyed indicated that they had used the Internet in the last 12 months. A more informative question is the one regarding the frequency of Internet use at home in the last 12 months. In this regard, no meaningful differences are observed by sex,[3] although they are by age. For example, nearly 100% of people aged 18 to 24 stated they used the Internet at least once a day, whereas for people aged 65–74 and 75–84, the percentage drops to around 75%. This is consistent with the study's finding where, establishing four types of families, the households with less Internet access (54.6%) are those composed exclu-

1 It does not take into account the new regional structure, instead using the division into 15 regions.

2 In the case of the Magallanes region, as well as the Aysén, Atacama, Tarapacá, Los Ríos, and Arica y Parinacota regions, the sample included 100 households for which there could be sampling problems. For the expansion factors per household, this study used as its basis of calculation household information from the 2016 pre-Census that recorded 6,421,382 homes. And in the case of population, they used information from the INE Master Sample of the 2011 Housing Census and its population projection, establishing the population over 18 years of age at 14 million.

3 It is important to highlight that the study did not consider representativity rates by sex in its sampling framework (the report only shows them by age brackets). Furthermore, there are two sex variables (for access and for use) in the database, since they divided the survey in two modules that could be answered by different people (although in 90% of the cases they were answered by the same person). The calculation of expansion by individuals gives a ratio of 47% men and 53% women, very different from that found in the 2017 Census.

sively of people aged 65 and older. While the report states that 10% of the households surveyed reported the presence of household members belonging to or descended from indigenous people, there was no such question found in the available database. Similarly, there were no questions linked to migration found that would evaluate the Internet access of the migrant population in the country.

Aside from these figures on Internet access, various research studies have posited that Chile presents significant inequalities in the type and quality of access, diversity of uses and in the digital competencies needed to obtain the benefits of accessing the Internet (Correa et al., 2018). For example, connecting from mobile phones is not the same as from fixed connections, with the latter being connections that effectively enable better digital inclusion with a greater variety of uses and digital competencies. However, as seen in the survey, 44% of households do not have a fixed Internet connection, and the trend in the country has been of increasing mobile Internet access. Variables such as age, socioeconomic level, remote geographic area or education would be highly determinant with respect to Internet access and the variety of uses. According to an Organization for Economic Cooperation and Development study (OECD 2019), Chile is positioned at the average of OECD countries in the level of inequality in Internet uses, and it is the country with the second highest digital competency gap, after Turkey.[4,5]

Regulatory context

Review of regulations and case law shows that there are a variety of salient angles relevant to this work regarding the protection of personal data, data processing by the State and the digitalization of government processes. This multiplicity of regulations makes it difficult to speak of a homogeneous and coherent body of laws on the matter. And despite the regulatory debate having been focused on data protection, doubts persist around the implications of ADM and artificial intelligence systems.

Personal data protection

According to doctrine and case law, the protection of personal data in Chile can be deduced from the interpretation of Article 19(4) of the Chilean Constitution of 1980 (Cerda, 2012), which indicated that "respect and protection of the private and public life and of the honor of the individual and his [or her] family" must be guaranteed (p. 15). Thus, there is neither an explicit protection of personal data nor a clearer definition of private life. As pointed out by Lara, Pincheira and Vera (2014), "privacy has been developed primarily at the case-law level in terms of the inviolability of private communications and the home, with emphasis on the discussion and definition of which communications are considered private and which are public" (p. 27).

In 1993, then Senator Eugenio Cantaurias Larrondo of the right-leaning Unión Demócrata Independiente (UDI) party, introduced a bill in the Senate that sought "to give adequate protection to individuals' right to privacy, in the area of Civil Law, in the face of potential illegitimate intrusions" (p. 4). This bill was debated for several years until in 1999, Law 19.628 on Protecting Privacy was published; this law regulates "the processing of data of a personal nature in registers or databases," thus focusing on the collection, storage or sharing of personal data (see Lara et al., 2014; Viollier, 2017). The law formally states that the manual or automated processing of personal data may only be done by virtue of legal authorization or authorization by

4 It is important to note that this gap was calculated using the ratio between the standard deviation of the score of problem solving in technological environments from the PIAAC study and the average score of the same variable. Considering other forms of measuring digital competencies, more research must be conducted on the matter.

5 One relevant data point from that study is that Chile has a large percentage of individuals who report having experienced a breach of their private information on the Internet in the last three months, being the country with the second highest percentage among OECD countries, behind Korea.

the data holder, and in writing. Pursuant to the law, affected people may turn to the courts to protect their rights regarding the processing of their personal data, using the action called habeas data.

While this law was one of the first personal data protection laws in Latin America, it has been the object of varied criticism due to the speed with which it became outdated and its ineffectiveness in achieving the due protection of individuals facing poor handling of their data by third parties. According to Jijena (2010), this law was drafted with the direct input of actors interested in the business of data.[6] It was possible to see this issue in how data from "sources accessible to the public" were defined as not requiring authorization from the owner for their processing, and most personal data was considered to fall under this heading. Furthermore, the law did not include an oversight entity to enforce the personal data protection, nor complaint and punishment mechanisms that would help achieve adequate protection of personal data. For these reasons, in the end the law is a "simple statement of principles" (Jijena, 2010, p. 414).

The Protecting Privacy Act has been subject to several amendments. One of these, of particular relevance to this report, is Law 20.521. This law seeks to guarantee that information provided by commercial risk predictors is precise, up-to-date and accurate. This motion, filed in 2009 and published in 2011, was focused on best regulating the personal data processing undertaken by companies providing commercial assessment, such as Equifax. As commented during debate over the law, the company formerly known as Dicom created a commercial risk predictor that assigned people a score of between 0 and 1,000 points, where 0 is the riskiest and 1,000 the least risky. The risk predictor was calculated based on three primary factors for the person: the number of protests, the number of delinquencies and the number of background requests to Dicom in the last three months. This final factor was subject to challenge, since when more requests were received for a determined identity number or RUN[7] (e.g., in comparing loan quotes from different banks), the owner's risk classification increased, raising the cost of the loan or even leading to rejection of the application, regardless of whether the person actually had any debts. For this reason, the original motion sought to avoid using information on the frequency of requests regarding personal data to assess a person's commercial risk. However, during the legislative process, the law came to forbid "the production of any kind of commercial risk predictions or assessments that are not based solely on objective information related to delinquencies or protests" (Law 20.521). This is very interesting, since not only is the protection of the information's privacy regulated, but also the practice of risk prediction and the factors that could potentially be included in such prediction. Given that one of the promises of machine learning techniques aims at the capacity for the machine to discover predictive factors on its own and that these may seem counterintuitive to human eyes, this example shows types of regulation in which the law defines which factors should and should not be included in a model.

Another law also linked to financial assessment is Law 20.575, which establishes the principle of finality in the processing of personal data under the Protecting Privacy Act. This principle was already mentioned in Article 9 of Law 19.628: "Personal data must be used solely for the purposes for which they were collected." However, as mentioned above, this law makes a major exception for data collected from sources accessible to the public. For this reason, Law 20.575, published in February 2012, sets out that the principle of finality must be respected in all types of commercial risk assessment, as these kinds of assessments are being used for other purposes, such as hiring.

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6 Such as Dicom S.A., the Direct Marketing Association of Chile (Asociación de Marketing Directo de Chile), the Santiago Chamber of Commerce and the National Chamber of Commerce of Chile.

7 The Unique Taxpayer Record (Rol Único Tributario, RUN) is the unique identification number implemented in Chile in 1969.

Despite the fact that the Protecting Privacy Act has been amended on several occasions over the last twenty years, it has been noted that serious structural failings remain that make it ineffective for protecting people from possible harm and discrimination in the processing of personal data. Neither does it meet international personal data protection standards (Matus, 2013; Velasco & Viollier, 2016; Viollier, 2017; Peña & Matus, 2019). Moreover, the debate surrounding these modifications has been focused on commercial risk assessment; but in light of the plurality of ADM systems under development, we must ask what happens when algorithmic risk classifications are created outside the commercial sphere. Should there be regulation of which factors can be used in these predictions? Can the current law regulate potential harm caused by reorienting databases or including counterintuitive factors, even when these increase the efficiency of algorithmic predictions?

In parallel with the amendments to the Protecting Privacy Act and after four years of processing in Congress, on May 15, 2018 the Chilean Senate approved the amendment of Article 19(4) of the Constitution to give constitutional status to the right to personal data protection. Respect for and protection of private life and the honor of individuals and their families is joined by "the protection of their personal data. The processing and protection of these data shall be conducted in the manner and under the conditions established by law" (Law 21.096). This gives greater urgency to the question of how a right with constitutional ranking is defended and guaranteed against the algorithmic predictions of ADM.

Access to public information

In 2005, a new Article 8 was incorporated into the Political Constitution, emphasizing that all public officials must comply with the principle of integrity in all their actions. To give shape to the measure and guarantee it, in August 2008, Law 20.285 was enacted, enshrining the right of access to information from State administrative entities, such as acts, files, contracts, agreements and other documents. Within this right the following principles are recognized: relevance, freedom of information, openness or transparency (with a few exceptions, all information in the hands of State Administration agencies is presumed to be public), maximum disclosure, divisibility, facilitation, non-discrimination in information delivery, expedience (maximum possible speed), control, responsibility and free access to information from Administrative entities. The protection of sensitive data is established as an exception to the public nature of information, being understood as:

> personal data that refer to the physical or moral characteristics of individuals or to facts or circumstances of their private life or privacy, such as personal habits, social origin, ideologies and political opinions, religious beliefs or convictions, physical or psychological health status and sexual life (Law 20.285).

This law also creates a new body called the "Council for Transparency" (Title V, "Consejo para la Transparencia," CPLT), an autonomous entity of public law with its own legal personhood and capital resources. Since 2009 the purpose of the CPLT has been the observation, promotion and oversight of standards surrounding this right of access to public information, defining active and passive transparency mechanisms as well as infractions and sanctions for failing to comply with them. Within its powers it is explicitly established that the CPLT must ensure proper compliance with Law 19.628 on personal data protection by the State (Article 33(m)). However, it does not establish punishment mechanisms for this, much less for organizations outside the State (Matus, 2013). Moreover, the tests for harm and interest used to weigh the rights of access to State information and of data protection are based on the public benefit of making information known, without getting into issues such as the algorithmic processing that information reserved by the State could undergo.

Review of CPLT case law on key terms such as "algorithm," "algorithmic," "artificial intelligence," and "predictive" show a nascent interest by citizens in requesting information on algorithmic systems.[8] Given the CPLT's powers, in these cases the only debate is whether or not it is appropriate to make information related to algorithms public. Case law more relevant to this report has been generated in regard to the data of minors,[9] in which the CPLT has reiterated that these have particularly sensitive characteristics since there would be no clear consent from the owner, given that children/adolescents are less aware of the risks entailed in the processing of their data. In this case law, the CPLT has resolved to provide information such as SIMCE academic evaluation scores[10] only to those confirmed to be the father, mother or guardian of the underage person. In other cases provision of the information has been denied, since it could expose the minors to public awareness and cause a current, probable and specific harm to their privacy. In these kinds of cases, the CPLT has cited what Professor Lorena Donoso has mentioned, in the sense that:

> "minors' personal data processed in the education system cannot be considered as arising from sources accessible to the public in order to proceed with their disclosure (Article 7 of the LPDP [Protecting Privacy Act]), and they deserve protection despite the gaps in our legislation on the subject, especially considering that one of the principles of our legislation is the best interests of the child." Likewise, the Convention on the Rights of the Child establishes in Article 16.1 that "No child shall be subject to arbitrary or unlawful interference with his or her privacy, family, home or correspondence, nor to unlawful attacks on his or her honor and reputation" (CPLT, 2011, p. 11).

It is under this concept of personal data of minors that the CPLT, for example, questioned a scandalous agreement between the National Minors Service and the National Intelligence Agency which failed to comply with the protection of children/adolescents' data (CPLT, 2020).

Digital Transformation of the State

In recent years a Modernization Agenda has promoted a digital transformation of the State that adds new standards relevant to this study. In June 2018, the Office of the Secretary-General of the Presidency (Ministerio Secretaría General de la Presidencia, SEGPRES) sent a bill on digital transformation of the public sector to the Senate (Message No. 063-366). This project was fundamentally focused on the digitalization of State entity procedures which by regulation had to be carried out on paper.

In parallel to debate on the project, in April 2019 the Digital Government Division of SEGPRES launched its State Digital Transformation Strategy. Using the language of citizen empowerment, the document proposed the promotion of data and public information openness as necessary to their use and re-use by the State and society, in order to generate public value. However, there is criticism that most State databases have data quality problems in terms of integrity and relevance, as well as the non-existence of "clear or up-to-date standards allowing these data to interoperate with one another and to be open, treated securely and subject to guarantees of anonymization or non-bias in the use of algorithms" (p. 19). To remedy this situation, the strategy proposes advancing toward a "data-based State," including as main measures the definition of a

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8 Some requests for information from algorithmic systems can be mentioned: to the Superintendency for Social Security (C3570-19), Undersecretariat for Public Health (C5575-19), National Intelligence Agency (C4029-17), Chile Public Health Institute (C4287-17), National Minors Service (C2838-17 / C3045-17), Social Security Institute (C1359-12).

9 Requests consulted: C80-10, C579-10, C816-10, C906-10, C15925-13; C2738-14; C230-15.

10 The SIMCE is the System for Measuring Educational Quality (Sistema de Medición de Calidad de la Educación) and seeks to assess the quality of teaching in the country's schools using periodic testing in several subjects.

National Data and Artificial Intelligence Policy and "strengthening the optimization of public policies and the automation of processes, via the use of emerging technologies such as artificial intelligence" (p. 19). In this regard, the Digital Government Division can be found working on a "Data Policy" for the State, which will set out the main guidelines and actions for leveraging the benefits derived from the intensive and strategic use of data in public institutions.

To give legal support to this Strategy, the government expedited processing of the bill on digital transformation of the public sector, which ended up being approved in September 2019. The law as published amended articles of Law 19.880, which establishes the bases for the administrative processes governing the acts of State Administration agencies. For example, it adds the principles of interoperability and cooperation as general principles regarding electronic media:

> "The principle of interoperability says that electronic means should be capable of interacting and operating with one another inside State Administration, using open standards that allow for a secure, rapid interconnection among them. The principle of cooperation means that the different agencies of State Administration must cooperate effectively with one another in the use of electronic media" (Law 21.180).

The law goes on to mention that in virtue of these new principles, all documents or information relevant to one State Administration agency should be sent via electronic means. It also indicates that in the case such documents or information contain sensitive data, as defined in Law 19.628, prior authorization of the interested party shall be required, along with leaving a record of the request. This emphasis on cooperation and interoperability of systems and information within the digital transformation of the State suggests an increase in the possible uses of any given database, which could affect the principle of finality mentioned above.

International agreements

In terms of international standards and agreements, various legal instruments are being drafted to guide development of AI, creating a whole "marketplace" (Floridi, 2019) of principles, designs and ethical frameworks, with different emphases and recommendations. Examples include "Ethically Aligned Design," which prioritizes human well-being in the creation of autonomous and intelligent systems; "Ethics guidelines for trustworthy AI," developed by an independent group of 52 experts created by the European Commission; and the Inter-American Development Bank's fAIR LAC project for Latin America and the Caribbean (Cabrol et al, 2020; Floridi & Cowls, 2019; Jobin et al., 2019).

More specifically, in May 2019, seven Latin American countries, including Brazil, Colombia and Chile, adhered to the OECD Recommendation of the Council on Artificial Intelligence developed by the Committee on Digital Economy Policy. The document seeks to provide a collection of internationally agreed upon principles and recommendations that can promote a trustworthy response to the AI-powered crisis. The principles proposed include designing artificial intelligence systems of an inclusive and sustainable nature, that respect human rights and democratic values and are focused on human beings; offer a clear commitment to transparency and explainability; are robust and safe throughout their life cycle; and, finally, have accountability mechanisms. In the second section, the document's outlook is revealed: it recommends governments invest in AI research, strengthen the digital ecosystem around AI, create policies that facilitate the implementation of trustworthy AI systems, and adapt their regulatory frameworks to promote AI innovation and capabilities. Finally, mention is made of the recommendation to create human capacity and prepare for transformation in the labor market, establishing cooperation agreements among countries to promote AI. However, this document and others like it provide scant recommendations with no mechanism for enforcing the aforementioned principles.

Another set of relevant international standards on the subject is the Digital Economy Partnership Agreement (DEPA) signed between Chile, New Zealand and Singapore in June 2020. The objective of this agreement is to create a shared regulatory framework to strengthen the digital economy,[11] free flow of data, non-discrimination of digital products and interoperability among the systems of the signatory countries. Strongly focused on the economic and social benefits of developing the digital economy and data trade among the countries, the agreement establishes commitments in cross-border transfer of information by electronic means for conducting business (Article 4.3), e.g., collaborations on projects for cross-border data exchange among businesses and the creation of regulatory data sandboxes to promote "data-driven innovation" (Article 9.4). At the same time, the agreement defines the principles that would underpin a "robust legal framework for the protection of personal information," including: (a) collection limitation; (b) data quality; (c) purpose specification; (d) use limitation; (e) security safeguards; (f) transparency; (g) individual participation; and (h) accountability (Article 4.2). Moreover, it mentions that the parties will endeavor to establish AI governance frameworks to facilitate the adoption and use of AI in the countries, highlighting as principles those that are "internationally recognized, including explainability, transparency, fairness and human-centered values" (Article 8.2)

Discussion

The review of sets of standards for data, algorithms and digital economy reveals a variety of initiatives, making it difficult to imagine a coherent body of laws. First, the number and origin of data protection initiatives being developed in parallel is worrying. In tracking down legislation and case law, a growing intersection is seen between the right to informational self-determination and the right of access to public information, an issue that has been heavily commented on in the literature (Jijena, 2010; Matus, 2013; Viollier, 2017).

This can be seen even more clearly with the current debate within the Treasury Commission of the Senate regarding a bill (Gazette 11144-07, amended and restated with 11092-07), entered on March 2017, which amends the current law on protection of privacy. This bill would update the law, bringing it in line with recent international standards such as the European General Data Protection Regulation, and it has been pointed to as a way to comply with recommendations on the subject from the Organization for Economic Cooperation and Development.

The bill sets out the guiding principles for regulating the processing of personal data, such as the principles of lawfulness of processing, finality, proportionality, quality, security, responsibility and information. Furthermore, what are known as the ARCO rights are added: access, rectification, cancellation and objection to processing of personal data. Data owners' consent continues to be the basis for legitimatizing processing, and clearer criteria are established for evaluating this consent and its exceptions. The bill sets forth new standards for processing personal data categorized as sensitive, where health, biometric, biological profile and geopositioning data are added. Moreover, it regulates international data sharing (Title V), allowing flow to countries considered appropriate due to their legislation and establishing conditions in cases of sharing data with countries not considered appropriate.

The bill also creates a Data Protection Agency that will ensure the protection of the rights and freedoms of individual data owners, as well as adequate compliance with the standards. The future agency will be granted powers to regulate, monitor, oversee and punish non-compliance; these powers can range from written reprimand to fines of up to 10,000 monthly taxation units (Unidades Tributarias Mensuales). In July 2018, the Executive Branch proposed that this role be fulfilled by the CPLT. In a divided vote on August 5,

11 In the press, the following were mentioned: hosting for web sites, software licensing, information processing, maintenance and repair over the Internet, applications development (EFE, 2020).

2019, members of the Constitutional Commission agreed to back the Executive's direction. Thus, by giving the role of protecting personal data to the CPLT, one single institution is set up as guarantor of the right to informational self-determination with access to data from the State or from public sources.

Second, the great plurality of legislative initiatives from different ministries and Congress leads to doubts about how to move forward with clear, shared definitions of the main standards for developing artificial intelligence and ADM systems in the country. For example, how can the principles of interoperability promoted in the DEPA, and the Digital Transformation of the State Strategy be in dialogue with the principle of finality from the Protecting Privacy Act, or how can the multiple understandings of consent and the ways that concept was expressed throughout the documents reviewed be harmonized.

Third, while the current legal framework extensively discusses the nature of personal data, it spends less time on the type of processing, which is generally defined quite broadly as any operation on data: collection, storage, sharing, dissociation and many more. Given the complexity of AI and ADM systems, it seems necessary to consider the particularities they add to the debate and to approximate possible standards for certain types of processing based on predictive models that turn out to be more dangerous than others, or to assess potential evaluation, monitoring and algorithmic auditing measures for such processing. In addition, there is lengthy reasoning based on a shared idea that the legitimacy of personal data processing is fundamentally rooted in the owner's consent or authorization, which can be reduced to a merely individual, rather than collective, issue. Moreover, given the inscrutability of algorithmic systems and complex changes in the policies and terms for digital systems and platforms, it again becomes necessary to question and investigate what users understand and value when they authorize the processing of their personal data. In the end, it becomes critical to re-think the mechanisms used and the legitimacy of algorithmic data processing.

Fourth, and of particular relevance for our case study, it is noteworthy that with the exception of CPLT case law, current legislation contains no special consideration for when the ownership of the information is held by vulnerable groups such as children and adolescents. It is precisely this vacuum that the bill still under debate intends to address, by regulating the processing of personal data related to children and adolescents,[12] indicating that the processing can only be performed when responding to their best interests and respecting their progressive autonomy. To process a child's personal data, specific express prior consent shall be required of the person in charge of the child's personal care. In the case of adolescents, on the other hand, their personal data could be processed under their authorization, as for any adult, with the exception of sensitive personal data, for which the authorization of their caretaker will be required.

In all, the current national legal framework is fragmented and insufficient to effectively and clearly protect individuals from the discriminatory consequences that could occur with the collection and processing of large databases of personal information using algorithmic ADM systems (Velasco & Viollier, 2016). The bill currently making its way through the legislative process would surely allow some progress toward a due protection of individuals around their personal data, but the question remains regarding the coherence between the different standards reviewed and their ability to regulate the social, political and ethical implications of artificial intelligence and automated decision-making systems.

Institutional Context

This section will review Chile's governmental institutional structure for technological development and artificial intelligence in particular. The Government of Chile's science, technology and innovation policy has historically been put forward in a fragmented manner among multiple government institutions with different sensibilities (See Bustos Velásquez, 2016). Dominated by a strong emphasis on business and the

12 In this bill, children under age 14 are considered minors, and adolescents are those over 14 and under 18 years old.

productive matrix, the Ministry of Economy, Development and Tourism has coordinated different public initiatives and institutions for technological development and innovation in the country. The Chilean Economic Development Agency (Corporación de Fomento de la Producción, CORFO), created in 1936 and reporting to the same Ministry, has the objective of increasing productivity and job opportunities by boosting investment, innovation and entrepreneurship in the country. Some examples are the INNOVA-Chile or Start-Up Chile program, the Government of Chile's accelerator to boost technological enterprises.

On the other hand, a dominant role has been played by the Ministry of Education, institutions of higher learning and especially the National Commission for Scientific and Technological Research (Comisión Nacional de Investigación Científica y Tecnológica, CONICYT), created in 1967 and originally reporting to the Ministry of Education. With a perspective focused on scientific and technological development, it was in charge of human capital formation ("Becas Chile" scholarship programs) and the development of scientific and technological research (FONDECYT, FONDAP, etc.), as well as the latter's dissemination and connection to society via the Explora program. In parallel to these institutions, in 2005 the National Council on Innovation for Competitiveness (Consejo Nacional de Innovación para la Competitividad, CNIC), an independent entity advising the President of the Republic, focused on prospective analysis of global and national development trends and on the formulation of proposals to strengthen the country's system for innovation. Starting in 2014, the CNIC was enlarged and changed its name to the National Council on Innovation for Development (Consejo Nacional de Innovación para el Desarrollo, CNID), shifting from an angle focused on economic competitiveness to a broader understanding of sustainable, inclusive development.

This scenario changed following the publication in 2018 of Law 21.105, which established the National Science, Technology, Knowledge and Innovation System, made up of public agencies, public research and development institutions and state institutions for higher education, and individuals and private institutions that conduct, promote or support relevant activities related to science, technology and innovation. Its purview includes training highly qualified human resources and specialized technicians; basic and applied research and the generation of knowledge in diverse disciplines; the development of technology transfer and dissemination; and public and private innovation in all its dimensions (Law 21.105, 2018). While the Ministry of Economy, CORFO and the Ministry of Education all retain their importance within the system, the law creates a new institutional structure: the Ministry of Science, Technology, Knowledge and Innovation (Ministerio de Ciencia, Tecnología, Conocimiento e Innovación, MCTCI). This State agency is set up as the "lead agency" for policies, plans and programs that promote and guide research in all areas of scientific-technological knowledge, technological development and innovation. The MCTCI is organized in Regional Ministerial Undersecretariats headed by an Undersecretary and grouped into macro-zone coordination entities, all of which must answer to the Minister of the portfolio (Law 21.105, 2018). Under its assigned responsibilities, the MCTCI drafted the first National Policy for Science, Technology, Knowledge and Innovation, which will guide scientific and technological development policy for years to come.

Along with this, starting in January 1, 2020, CONICYT made way for the National Agency for Research and Development (Agencia Nacional de Investigación y Desarrollo, ANID), a decentralized public service reporting to the MCTCI, with its own legal personhood and capital, whose aim is to oversee and execute programs and instruments designed to promote, foster and develop research in all areas of knowledge, technological development and scientific-technological innovation in accordance with the policies defined by the MCTCI. Furthermore, ANID absorbed management of CORFO's Technological Capabilities and the Millennium Scientific Initiative Program (Programa Iniciativa Científica Milenio, ICM), which had previously been incorporated into the Ministry of Economy. Institutes of great significance for the development of artificial intelligence in the country have been created within the latter, such as the Data Fundamentals Millennium Institute (Instituto Milenio Fundamentos de los Datos, IMFD) or the International

Institute for Business Innovation (Instituto Internacional para la Innovación Empresarial, 3IE) of the Universidad Técnica Federico Santa María.

With the new MCTCI and ANID institutional structure it is hoped that technological development can achieve greater consistency and financing by being concentrated under its own institutional structure with ministerial ranking. The role the new Ministry is adopting in its area of work on artificial intelligence can already be seen. While as of the date of this study no legislative reforms specific to AI or ADM systems have been implemented, and no specific agency or institutional structure for monitoring artificial intelligence initiatives has been created in Chile, initiatives in this area have started to be developed since 2019.

An example of this was the preparation of the Toward an Artificial Intelligence Strategy for Chile document created by a working committee[13] formed by the Senate Commission on Challenges of the Future, Science, Technology and Innovation.[14] The document "establishes the bases showing the design needed for an AI strategy in Chile" (p. 7). It was developed under a "mixed model" in which a group of academic advisors researched Chile's context in terms of AI and debated the draft document in just three expanded meetings at the Ex National Congress in Santiago with representatives from the public, private, academic, labor and civil society spheres, although the vast majority were actors from the private and academic domains.

In August that same year, President Sebastián Piñera assigned the MCTCI to prepare a National Policy and an Action Plan on Artificial Intelligence, which would be launched in late 2020. As indicated in a draft: "The mission of this policy is to empower Chileans in the use and development of AI tools, fomenting debate around their legal, ethical, social and economic consequences." To develop this policy, the government proposed a) the creation of an Expert Advisors Committee[15] which since September 2020 has been supporting the preparation of a base document for the Policy; b) the formation of an Inter-ministerial Committee made up of ten ministries and three services, headed by the MCTCI, which will develop an Action Plan and incorporate the State's vision into the Policy; c) the holding of seminars on artificial intelligence between November 2019 and June 2020 in all regions of Chile with the objective of disseminating technology and gathering local input for the policy. The whole policy preparation process has been coordinated by the Future Office of the MCTCI, headed by José Antonio Guridi.

Without providing their rationale, the inter-ministerial committee and the expert committee divided the debate on the national AI policy into three main topics:

i. *Enabling factors:* those elements considered necessary for the development of artificial intelligence, mentioning (1) data, including their sources, standards, protection, etc.; (2) human capital, which covers schooling to training and labor reconversion, including technical, superior and post-gra

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13 Working committee composed of José Rodríguez, John Atkinson, Carlos Hernández, Juan Walker, Pedro Maldonado, Mario Ponce, Juan Velásquez, Álvaro Soto, María Escobar, Nayat Sánchez-Pi, Carlos Castro, Néstor Becerra, Wolfhart Totschnig, Martin Tironi, Claudio Gutiérrez.

14 Senate Commission members include Senator Guido Girardi Lavín (President), Senator Francisco Chahuán Chahuán, Senator Juan Antonio Coloma Correa, Senator Carolina Goic Boroevic, Senator Alfonso de Urresti Longton.

15 The Expert Committee on Artificial Intelligence defined by the government was made up of César Hidalgo, María Paz Hermosilla, Raphael Bergoeing, María "Cuky" Pérez, Alberto Cerda, Marcelo Arenas, Andrea Rodríguez-Tastets, Néstor Becerra Yoma, Álvaro Soto, Aisén Etcheverry. For more information on the education and affiliation of committee members, see: https://www.gob.cl/noticias/politica-nacional-de-inteligencia-artificial-ministro-de-ciencia-cierra-etapa-de-redaccion-junto-al-comite-de-expertos/

duate education; and (3) technological infrastructure, which includes fiber optics, the deployment of sensors, data centers and 5G networks.

ii. *Development of AI and its applications:* elements inherent to basic and applied research in AI, and the development of supply and demand for AI solutions considering all actors in the "ecosystem," which includes universities and research centers, non-governmental organizations, industry and the State.

iii. *Ethics, regulatory aspects and social and economic impact:* with no further definition, this area considers the "ethical, regulatory, economic and social challenges stemming from the development and use of AI, together with the opportunities that arise from the good use of this technology." Within this area, analysis of the United Nations Sustainable Development Objectives is mentioned.

In parallel, the Future Office began an "early participatory process" characterized as "unique in the world" in the development of AI policies and strategies (Guridi, 2019). From March to August 2020, a citizen participation process was started, with the preparation of documents and self-convened working tables of individuals and organizations. These working tables had to define the areas on which they would focus, and the Ministry had to evaluate the relevance of the activities ahead of time. As indicated in the call for participation, the "input generated by the participants will be collected and analyzed by the Ministry for its consideration in the preparation of the background document for this policy" (MCTCI, n.d., p. 2). According to sources, there were a total 69 regional working tables, 70 self-convened tables and 15 on-line thematic meetings. Finally, as indicated in the MCTCI's public report (2020), it is expected that during the second half of 2020 a public consultation will be conducted on the draft National Artificial Intelligence Policy document so that the policy could be published in late 2020. This policy and its action plan will provide the strategic guidelines the country should follow for AI through 2030.

However, the above-mentioned participatory process was not binding, and the question remains open of how the citizen participation will be included in the final policy. The supposed empowerment of citizens that the policy is intended to promote remains ambiguous when it seems to be more directed to promoting computation industry technologies and digital platforms. Likewise, doubts persist on the diversity of disciplines of the chosen experts and on the balance between the interdisciplinary Expert Committee and the government's Inter-ministerial Table. Furthermore, the arbitrary division of the three main topics gives the false idea of a separation between social, political and economic issues and the factors and possible applications of AI in the country. Rather than being seen as cutting across AI development, these issues are cloistered away in a third topic, reproducing disciplinary divisions and distinctions between techno-science and politics and economic interests.

Thus, beyond adherence to the OECD's Recommendation of the Council on Artificial Intelligence document, in Chile there is no formal adoption of ethical codes or standards, or of control, complaint and algorithmic auditing mechanisms in the area of artificial intelligence and ADM. In the future Artificial Intelligence Policy and Action Plan it is desirable for concrete measures to be defined in this regard.

CASE DESCRIPTION

The case under investigation in this report is the computerized system known as the "Child Alert System" (Sistema Alerta Niñez, SAN). This is a system developed and maintained by the Undersecretariat for Social Assessment and implemented at the Municipal Offices for Children (OLN) of the Undersecretariat for Children. Both undersecretaries report to Chile's Ministry of Social Development and Family.

The main problem or need that SAN attempts to address is that "children and adolescents present risk factors which, if not mitigated, will cause harmful outcomes such as teen pregnancy, problem consumption of alcohol and/or drugs, delinquency, chronic psychiatric illnesses, child labor and/or sexual exploitation, mistreatment and/or abuse, abandonment and school dropout" (Undersecretariat for Children, 2018, p. 2). Therefore, SAN's objective is to estimate and predict the level of risk to children and adolescents of suffering some violation of their rights, using data analysis with different algorithmic models, to enable anticipating and providing early, preventive intervention in each case. In practice, the system generates a "risk index" score for each child/adolescent. This allows the cases to be prioritized by the Municipal Offices for Children. In addition, the system has been set up as a platform for registering, managing and monitoring the cases of children and adolescents identified as being at greatest risk.

In tracing the social life of this tool, it is possible to distinguish two distinct points or phases in SAN. A first point comes with the system's design and development, involving actors from academia from both Chile and New Zealand, and strongly oriented toward the system's predictive nature. A second moment appears with the integration of SAN at the OLNs where the system is mobilized at a community level. In the process, expectations for the system are lowered, putting more emphasis on its capabilities for registration, management and monitoring of the cases entered, where SAN is mentioned as complementary to the information gathered by the OLN in each locality.

Background

To understand the case being studied, it is first necessary to briefly introduce the history of the institutional structure into which it is incorporated. The idea of an early warning system had already been proposed in Sebastián Piñera's 2018–2022 Government Program, which sought to achieve "Protected Childhood," mentioning for this purpose the creation of the "Childhood Alert" system for the follow-up, monitoring, evaluation and care of children and adolescents. It was indicated that this system would process information from ministries and public services, the Attorney General, Family Courts and other State institutions. The system's objective was "to conduct timely and restorative interventions in light of detected cases of school dropout, first contact with the penal system or the problematic consumption of drugs or alcohol, among others" (Piñera, 2017, p. 96).

On his first day in government, on March 11, 2018, Piñera convened a "Grand National Agreement for Childhood" that included ten points for improving the State's operations in terms of protecting the rights of children and adolescents. The seventh point mentioned creating a system he called "Childhood Alert" to "identify in a timely manner at-risk children, such as those who drop out of school, or leave home, or take drugs, or commit their first crime. Because the sooner we arrive, the greater our chances of recovering these girls and boys" (Presidential Address, March 11, 2018).

For April 2 the government convened a Working Table[16] for a National Agreement for Childhood (2018), which on May 30 delivered a document with 94 short-, medium- and long-term proposals. There the idea appears of designing a "territorial deployment for children or Local Childhood Office" (points 10–14, p. 5) whose many features included a proposed Early Warning System. Later on, in point 33, the document suggests creating an integrated information system based at the Ministry of Social Development for locally detecting "potential gaps that could negatively affect a child's development" (2018, p. 9). Emphasis is placed on the system being targeted, territorial and based on the estimation of risk factors related to individual, family, environmental and peer conditions.

On April 18, 2018, Law 21.090 was enacted, amending Law 20.530 on the Ministry of Social Development to create the Undersecretariat for Children. This amendment establishes that the Ministry "shall ensure the rights of children with the aim of promoting and protecting the exercise thereof in accordance with the System for Guaranteeing the Rights of the Child and in conformity with the Political Constitution of the Republic and its laws" (Law 21.090). Within this purpose, the Undersecretariat for Children is defined as the party responsible for the comprehensive promotion and protection of children's rights and for collaborating with the Ministry of Social Development in all matters related to children. In enactment of the law, President Piñera emphasized the preventive role of this new Undersecretariat: "The fundamental task, I would say, for the new Undersecretariat for Children [...] is preventing the children of our country from ending up in SENAME homes, because the natural place for a child is with his or her family" (Presidential Address, April 12, 2018). In June that year the staffing rolls were defined, and July 1 was set as the start date for the Undersecretariat for Children's activities (DFL No. 1), with Ms. Carol Bown designated first Undersecretary for Children (Decree 12).

The creation of the Undersecretariat for Children is framed within a greater institutional structure for the comprehensive protection of children's rights. Within this structure, the creation of Municipal Offices for Children (OLN) was sought as a village-level administrative device for the promotion, prevention and general protection[17] of children/adolescents' rights, based on agreements between each municipality and the MDSF. The object of intervention for the OLNs was all children and adolescents, from gestation to 18 years of age, who present risk factors for violations of their rights, along with their respective families.[18] The legal creation of the OLNs is included in the bill on the System for Guarantees and Comprehensive Protection of Children's Rights (Gazette No. 10315-18) which has been in the congressional pipeline since 2015. For this reason, the OLNs have been implemented during 2019 as a pilot program in 12 municipalities in 10 regions

16 The participants in this working table totaled 21 people, of whom 14 were government authorities and 9 parliamentarians.

17 General protection is differentiated from specialized protection, the former being understood as focused on protecting the rights of children and adolescents via the services, benefits and care they require. In contrast, specialized protection is that oriented to children and adolescents that have already had their rights violated; it would correspondingly be referred to the Office for Protection of Rights (Oficina de Protección de Derechos, OPD) in each municipality.

18 Children and adolescents who have been users of SENAME Programs and have judicial protection measures are excluded, since the focus of the OLNs is to prevent violations of rights, and attempts are made to avoid duplication of actions with other specialized programs for this group of children and adolescents (Undersecretariat for Children, 2019, p. 27).

of the country.[19] The OLNs continue the "Chile Crece Contigo" Sub-system for Comprehensive Protection of Childhood, and they both find their basis in and expand the "Chile Crece Contigo" Village Network.[20]

Tender process for a targeting instrument

In parallel with the institutional development of the Undersecretariat for Children, a network began to form among actors linked to the academic sphere. In May 2018, the Director of GlobLab UAI, María Paz Hermosilla, invited the scholar Rhema Vaithianathan, co-director of the Centre for Social Data Analytics (CSDA) of Auckland University of Technology (AUT) in New Zealand, to visit Chile. As Hermosilla tells it, she met Vaithianathan at a conference in New York in September 2017 and decided to invite her to Chile after the announcement of Piñera's National Agreement for Children and Adolescents (Noticias UAI, 2018). Vaithianathan has vast experience in the preparation of predictive models for the public sector, stretching back to 2012 when in collaboration with AUT researchers she developed a predictive model for the New Zealand Ministry of Social Development for the prevention of child abuse, based on 132 data points (Vaithianathan et al., 2012). In the end the model was not implemented, but since then Vaithianathan has participated in the development of these predictive models in other countries, such as the United States. In 2016, she managed development for Allegheny County (Pennsylvania) of the first implemented automated risk calculation algorithm, the Allegheny Family Screening Tool for predicting childhood risk using a direct hotline to the county's social services (Vaithianathan et al., 2017). During her visit to Chile, Vaithianathan gave an expert talk called "Predictive Risk Modelling for Vulnerable Children" and held a series of meetings with MDSF professionals to share her experience with implementing these predictive models in child protection services.

Four months later, the Undersecretariat for Social Assessment entered the scene. One of the duties of this Undersecretariat is the creation of tools for the design and evaluation of MDSF social programs that contribute to better targeting of social spending. On this basis, on August 31, 2018, the Undersecretariat for Social Assessment approved the terms of reference for a tender to create the Child Alert System (Exempt Resolution No. 0341); however, this tender "displayed a series of errors that would not allow the process to be optimally completed" (Exempt Resolution No. 0346). Therefore, on September 6 a new tender was published, No. 730566-13-LQ18, which sought the "Construction of the Child Alert targeting instrument," whose purpose was "to develop a proposal for a targeting instrument in Chile to identify Children and Adolescents at risk of harm" (E.R. No. 0346). In the press, the Undersecretary for Social Assessment, Alejandra Candia, indicated that the development of this instrument would follow a logic similar to the calculation of socioeconomic scoring used by the Social Registry of Households to "organize the list of those who have higher or lower levels of vulnerability." However, as was also stated by Candia, SAN would be a kind of progress from a reactive model to a more preventive one, with SAN being the first step in this direction (González, 2018).

In the terms of reference for the tender, a budget of 159 million Chilean pesos and a deadline of 230 days from approval of the contract were set for developing the instrument. In addition, an evaluation committee

19 The pilot test for the OLNs is being conducted in the villages of Iquique, La Serena, San Felipe, Colina, Santiago, La Florida, Requínoa, Cauquenes, Quillón, Concepción, Nueva Imperial and Puerto Aysén.

20 The OLNs' Technical Specifications establish that in those villages implementing both the pilot test and also the Municipal Strengthening Program (Programa de Fortalecimiento Municipal, PFM), the Municipality must designate one single professional to carry out the role of OLN General Coordinator and Village Coordinator for "Chile Crece Contigo". Furthermore, the current Chile Crece Contigo Coordinator will preferentially assume the role of General Coordinator for the OLN (Undersecretariat for Children, 2019).

made up of three officials from the Undersecretariat for Social Assessment was set up.[21] As can been seen in the table below, evaluation of the proposals was principally based on one technical criterion, focused on the bidder's experience (60%) and its methodological proposal (20%). While one of the tender's specific objectives was to identify practical and ethical considerations and recommendations for the project, no minimum ethics concepts were defined as criteria for evaluating the proposals; instead, evaluation focused on the description of the technical proposal, its clarity, applicability and differentiating characteristics. In other words, instead of ex-ante establishing certain ethical regulations or at least recommendations, the bidder itself was asked to identify the relevant ethical considerations and recommendations to be addressed in the development of the products. In addition, an economic evaluation criterion was included (13%), and 5% of the weighting was left to the criterion of inclusive public procurement which evaluated whether the team had a gender equality policy and included workers belonging to indigenous populations, workers with disabilities, etc.[22]

Evaluation Criteria	Evaluation Sub-Criteria	Component
Technical Evaluation (80%)	Experience (60%)	Bidder's experience
		Working Team
	Methodological Proposal (20%)	Methodological Proposal
		Soundness and timeframes
Economic Evaluation (13%)		
Inclusive Public Procurement (5%)		
Fulfillment of Formal Requirements (2%)		

Table 1. Evaluation criteria for bids under the SAN tender process.

Source: Tender No. 730566-13-LQ18

During that same September when the tender was launched, GobLab UAI again invited Vaithianathan and her team to Chile via the New Zealand government's Latin American Strategy Fund, with support from the Embassy of New Zealand in Chile. On September 13, a second seminar was held titled "Learn about the best international practices in the design and implementation of early warning systems using predictive modeling," organized in coordination with the Ministry of Social Development and with participation from various ministerial authorities.[23] In addition, seminars were planned at the Valparaíso Congress.

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21 Memorandum No. 2289 (SEP/25/2018) defined that the committee would be composed of Amanda Dawes Ibañez (Social Policy Division), Javiera Troncoso Melo (Social Policy Division) and Mauricio Marcos Mera (DIS). However, according to Memorandum No. 020/215215 (OCT/08/2018), Marcos was withdrawn due to medical leave. and Veronica Acha Alvarez (DIS) took his place.

22 In that respect, the UAI and AUT proposal provides no information.

23 O evento começa com as boas-vindas do Reitor da Escuela Gobierno UAI, Ignacio Briones, a embaixadora da Nova Zelândia, Jacqui Caine, e a Subsecretária de Avaliação Social, Alejandra Candia. Houve duas palestras de Rhema Vaithianathan e Erin Dalton do Departamento de Serviços Sociais do Condado de Allegheny. Como comentaristas estiveram Maria Josefina Escobar, professora da Escola de Psicologia e membra do Goblab UAI e Carol Bown, Subsecretária da Infância, a moderação esteve a cargo de Maria Paz Hermosilla, Diretora do GobLab UAI.

A short time later, on October 26, 2018, the tender was awarded to a sole bidder: the joint venture between providers Adolfo Ibáñez University and AUT Ventures Limited (the marketing division of Auckland University of Technology). The evaluation committee gave the proposal a score of 68.8%. Conforming to the requirements of the terms of reference, that proposal's specific objectives were:

1. Development of prototypes of at least two predictive models that allow the identification of children at risk of harm using information contained in the Social Information Registry (Registro de Información Social, RIS). The models must have characteristics that can be made transparent, and which allow for the periodic calculation of risks (at least monthly) by the Ministry of Social Development team.
2. Identification of practical and ethical considerations and recommendations for the project and corresponding measures for addressing them. To this end a literature review is proposed, in conjunction with consulting experts from the State, international organizations, academia and civil society,[24] which would lead to the development of a strategy for conducting pilots of the predictive models.
3. Capacity building for the Ministry's team regarding the methodology used, for its on-going use by the Ministry of Social Development team. For this, the proposal was to hold a training workshop and to create both a manual for the methodology and instructions for use to train the model and evaluate its performance.

Table 2 shows the proposed budget from the sole bidder:

Table 2. Economic Proposal for the joint venture of providers between UAI and AUT Ventures.
* As a reference value the exchange rate listed by the Central Bank on the date of awarding the bid was used (1 USD = 687 CLP).
Source: Economic Appendix 1: Economic Proposal in UAI & AUT, 2018.

Item	Expense Unit or Specification	Value CLP	Value USD*
Professional Fees	9 consultants: Rhema Vaithianathan (Chief of Project), Diana Benavides, Katerina Taskova, Emily Kulick for Centre for Social Data Analytics (CSDA); and Andres Letelier, María Paz Hermosilla, Luis Herskovic, Matías Garreton, María Josefina Escobar for GobLab UAI	118.885.000	173.049,49
Viáticos	45 45 days	4.725.000	6.877,77
Passagens	2 Trips Rhema Vaithianathan NZ-SCL 1 Trip Diana Benavides NZ-SCL 1 Trip Emily Kulick Chicago-SCL	14.000.000	20.378,45
Outras despesas	Translations Final workshop	2.640.000 2.850.000	3.842,79 4.148,47
Utilidade		15.900.000	23.144,10
Valor total da proposta		159.000.000	231.441,04

24 An annex is included of a map of relevant stakeholders on at-risk childhood who can be interviewed.

The proposal lists the following products for the project: two progress reports, a final report and a training workshop for Ministry teams on the methodology and the user's manual for the system. The proposal tentatively set January 31, 2019 as the deadline for delivering the final product; however, the process was extended to the end of June 2019.[25] Using a request under the Transparency Act, access was gained to the final report and the presentation of the technical workshop held from July 2–4, 2019. These documents describe in detail the design and development of the final tool, which will be reviewed in the following section.

Design and development of predictive risk models

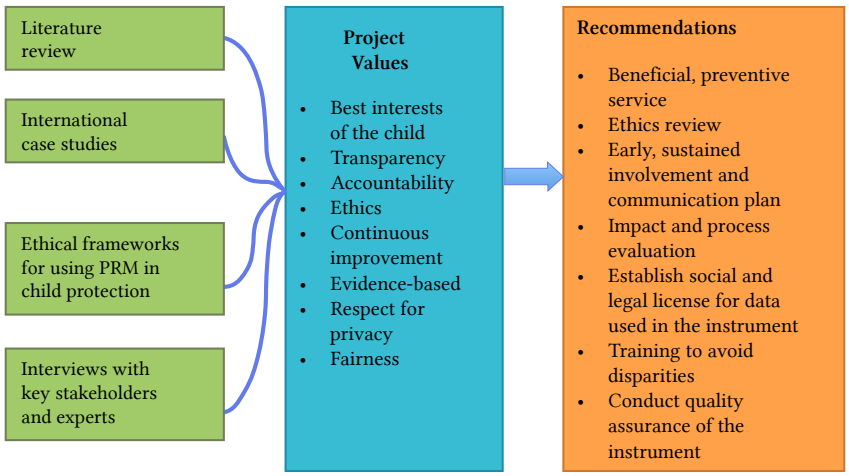
Despite the fact that the Undersecretariat for Social Assessment's tender process focused on the label "targeting," the proposal and subsequent reports from UAI and AUT place more emphasis on the construction of Predictive Risk Models (PRM), based on Vaithianathan's prior work. These are defined as follows:

A Predictive Risk Model (PRM) is a tool that uses established patterns in databases to automatically generate a probability (or risk score) of a specific event happening to an individual in the future. Since PRM often use data gathered for other purposes (e.g., governmental administrative databases) and can be automated, they can efficiently analyze large populations to identify a reduced number of people who are at higher risk (AUT & UAI, 2019, p. 107).

The project methodology included four processes for defining the project values and a series of recommendations for building the PRM, which are summarized in the following diagram.

Diagram of the methodology and recommendations from the Final Report

Source: AUT & UAI, 2019, p. 11.



First, in the literature review, emphasis is placed on the repercussions of arriving "too late" in protecting the rights of children and adolescents and on the forms of preventive work to mitigate risk factors for those rights being violated. Applying a neoliberal rationale, it is proposed that ensuring the State's prevention services prioritize families at highest risk is "an imperative that is both economic and ethical," considering the expense and limited capacity of these services (Vaithianathan et al., 2019, p. 34). For this, the different ways of estimating risk to children/adolescents is examined, with discussion of human discernment or

25 Recorded in the compliance and acceptance certificate for goods and/or services, signed by Amanda Dawes, Head of the Social Policy Division of the Undersecretariat for Social Assessment.

clinical judgment, actuarial models[26] and predictive risk models. These last elements are framed in the report as the most accurate, rapid, easy and cost-effective way to assess and automatically assign a risk score to each individual in the population, taking advantage of the government's huge volume of administrative data (Vaithianathan et al., 2019, p. 36).

Second, a review of seven international cases on childhood risk assessment instruments is presented,[27] in which many turn out to be proposals or theoretical tools; two are cases designed by Vaithianathan's own team. Different lessons are drawn from these cases for the instrument's pilot, of which the following are noteworthy: being open and transparent to achieve broad support from stakeholders from the start of the project; including all children and adolescents without measuring their socioeconomic level; externally validating the target variable; conducting an evaluation of impact, processes and ethics during the pilot at the Municipal Offices for Children; providing documentation on the tool's efficacy and how the scores and other relevant details are kept secure; achieving informed consent from the families in a clear, practical way and allowing them to opt out of the diagnostic tool; and ensuring that the codes and documents for the tools are proprietary to the State, in light of the opacity of tools that are based on commercial intellectual property.

Third, the ethical frameworks for the use of PRM in child protection are examined. The theoretical framework for harm vs. benefits is presented first, where actions are categorized as ethical or unethical, depending on the way in which the benefits derived from them outweigh the harm they cause. Reviewing literature and both national and international standards, the team identifies five relevant aspects: data privacy, the definition of consent, transparency in light of the algorithms' opacity, concern for fairness, and achieving social license or acceptance by the community. As specifically regards ethical frameworks for PRM in child protection, it is mentioned that there is scant public documentation of the international cases reviewed since nearly none had included any type of ethical framework analysis. In this regard, review is conducted of the Casey Family Program guide (2018), a qualitative study in which Vaithianathan participated (Brown et al. 2019); and Tim Dare's report (2013), prepared to evaluate Vaithianathan's predictive model for the New Zealand Ministry of Development. The latter was extensively reviewed and generated a series of recommendations, since it is a child protection use case nearly identical to the one contemplated by the MDSF.

Fourth, only five interviews were held with national data management or child protection experts.[28] The list of people interviewed was proposed by the main project team and approved by the MDSF counterpart. The report recognizes that the sample size was quite limited and argues that the objective was instead

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26 The final report defines the actuarial models as non-computerized decision-making models that instead depend on a user (e.g., a social worker) who answers a set of standardized questions about a case; these questions are translated into a risk score following pre-defined criteria.

27 The following systems are reviewed and compared: the Allegheny County Family Assessment Tool from the United States; the Early Help Profiling System (EHPS) from the United Kingdom; the Childhood Sexual Exploitation Model from Bristol; the New Zealand Ministry of Social Development Model; the Teen Pregnancy Prediction Tool from the Ministry of Early Childhood in Salta, Argentina, developed by Microsoft; Support for Notification Decision-Making from Denmark, developed by VIA Society & Social Work, VIA University College and the Center for Child Research of the University of Aarhus; and the Eckerd Rapid Safety Feedback Tool (ERSF), developed by Eckerd Connects & Mindshare Technology.

28 The report indicates that interviews were conducted with Paula Bedregal (Doctor, PUC), Slaven Rzmilic (Economist, CEP), Marcelo Sánchez (Fundación San Carlos de Maipo), Ana María Venegas (M. de Peñalolén) and Pablo Voillier and Patricio Velasco (Fund. Derechos Digitales).

to guide the design of a disclosure and consultation plan with stakeholders so the MDSF could carry it out in the future: "Once the MDSF has finalized design of the pilot, it is recommended that the ministry holds a second, more informed conversation with the stakeholders" (AUT & UAI, 2019, p. 29). Likewise, three international experts were interviewed,[29] but two are part of the counterpart itself and the third was the head of the Allegheny County Department of Human Services. The low level of development of the qualitative part of the project is noteworthy, especially when the tender proposal contained a map of various actors and stakeholders in child protection who could be interviewed, and in the interview notes themselves there are recommendations of additional experts to interview.

Based on these interviews, the literature review and reflections on their own experience, the report's authors describe universal values and principles that should guide implementation of the child protection predictive model.

Table 3. Summary of project implication values

Source: AUT & UAI, 2019, p. 106.

Interesse superior da criança	Todo o projeto foi concebido para o benefício primordial das crianças e adolescentes.
Transparência	Que somos proativas/os e autênticas/os a respeito da comunicação dos detalhes do projeto, contando às/os chilenas/os - em linguagem simples - o que mais querem saber.
Prestação de contas	A liderança é direta e bem identificada, de modo que as/os chilenas/os sabem quem é responsável pelo projeto perante elas/es.
Ética	Que os custos éticos do projeto são claramente detalhados e levados em consideração em todos os momentos para que possam ser ponderados em relação aos benefícios prometidos.
Compromisso para melhorar e criar uma base empírica	Que todas as agentes (funcionárias/os da primeira linha até administradoras/es de alto cargo, políticas/os e especialistas) estão empenhadas em melhorar continuamente o sistema, criando e respondendo a evidências.
Respeito pela privacidade	A privacidade dos dados é priorizada.
Equidade	Que o projeto está comprometido em reduzir a desigualdade nos resultados das crianças de acordo com a posição socioeconômica.

29 The report indicates that Tim Maloney (co-Director of CSDA and Chief Economist for the New Zealand Ministry of Social Development), Aimee Wilkins (CSDA Communications Director), and Erin Dalton (Deputy Director for the Data Analysis, Research and Evaluation Office of the Allegheny County Department of Human Services, United States) were interviewed.

Data

In terms of the instrument's modeling, at first it was determined that four algorithms based on four predefined age brackets and a single model for all ages—for a total of five models—would be developed. The four age groups were defined by the MDSF and correspond to educational levels.[30] However, in the report, attention is restricted to the models for the 0–3 and 14–15 age groups, and the single model. This was to reduce the work, supposing that the 4–5 years and 6–13 years age groups and the single model would have similar performance.

The tender proposal contemplated having access to a vast collection of databases for achieving "maximum prediction power" (AUT & UAI, 2018, p. 9), indicating that there would be access to data from the Office of Vital Statistics, SenaInfo, Education, Social Registry of Households,[31] "Chile Crece Contigo",[32] Medical Insurance, location data and subsidy data from the Social Security Institute (Instituto de Previsión Social, IPS). It was proposed to prepare a collection of data in which each row of the database would correspond to the children/adolescents' unique identification and would include characteristics of all the children/adolescents, as well as for their fathers, mothers and other adults in the household. Then, each file was going to be "labeled" using SenaInfo and Office of Vital Statistics data. This data labeling would be based on whether the child/adolescent came from the courts, the police or detectives as a victim of abuse or abandonment; if there was any origin in child protection services; if he or she received any child protection services; or if he or she died within a two-year timeframe.

This already presented highly diverse target variables for prediction and a vast accumulation of data sources. However, it was mentioned that not all the variables in those data sets were going to be predictive and given the limited time available for developing the instrument, they would base the decision on prior experience creating similar models in other jurisdictions, without specifying which.[33] According to this experience, it was emphasized that the history for the children/adolescents and their families found in SenaInfo, as well as location data (geo-referenced variables characterizing the residential environmental of each child/adolescent's home) would be highly predictive. Within these data, mention is made of collaboration with the scholar Matías Garreton for analysis of geopositioning and spatial data that would include data on crimes processed from police reports, using them to create indicators of local socioeconomic level, segregation and poverty surrounding the location of the child/adolescent's home.

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30 1) 0–3 years: Lower Infant Room Level: 0 to 1 year; Upper Infant Room Level: 1 to 2 years; Lower Intermediate Level: 2 to 3 years; Upper Intermediate Level: 3 to 4 years. 2) 4–5 years: First Transitional Level (pre-kindergarten): 4 to 5 years; Second Transitional Level (kindergarten): 5 to 6 years. 3) 6–13 years, General Basic Education. 4) 14–17 years: Middle School (p. 108).

31 The Social Registry of Households includes people who have actively demonstrated their decision to participate in MDSF targeting instruments to receive their State benefits. According to information received, this is a subgroup representing nearly 75% of the country's population that has actively demonstrated their intention to be included in that registry.

32 The "Chile Crece Contigo" System was created in 2007 and is administered by the MDSF for the comprehensive and cross-sector protection of children with a network made up of interventions and social services supporting children and their families from pregnancy to their integration into the school system.

33 This is particularly relevant if we consider that the prior experience mentioned by Adolfo Ibáñez University researchers was the development of a predictive risk model for crime in the village of Lo Barnechea to assist in the creation of patrol routes. By contrast, the Auckland University of Technology researchers did have experience in various projects linked to predictive instruments in the area of children in different counties and states of the United States.

The final report by Vaithianathan et al. (2019) specifies that for development of the "backbone" of the instrument's data, the research team had access to nameless data from the MDSF via a protected computer and they signed confidentiality agreements to protect the data holders' rights and safeguard the confidentiality and security requirements thereof. According to the final report (Vaithianathan et al., 2019), the data sources used to train the predictive models were data from SENAME, Chile Crece Contigo, the Ministry of Education (enrollment and academic achievement information from public and private schools in Chile), Social Registry of Households, census data on the vulnerability of neighborhoods and information on crime by neighborhood from the Undersecretariat for Crime Prevention (calculated at radii of 300 and 1,000 meters around each child/adolescent's home).

It was established at the start that it was necessary to have a two-year follow-up window or period for the children/adolescents, due to which the cut-off date was June 30, 2016. A crucial methodological decision was to set the age limit for children and adolescents at 15 years or younger as of the cut-off date. This is primarily explained by the target variables for prediction, which in the end were those related to the child's or adolescent's contact with the SENAME system, which is described below. Given that contact with SENAME is only possible for children under 18 years of age, all children/adolescents 16 and older would not have been monitored for the two full years of follow-up. For this reason it was defined to include only those children and adolescents who in 2016 were 15 years old or younger, to study whether they came to have contact with the SENAME system during the two years following the cut-off date (June 30, 2018). This methodological decision required excluding the group of children/adolescents aged 16 and 17 years who could show particular characteristics, but it was assumed that these are similar to the risk factors facing the 14- and 15-year-old age groups as follows:

> "the MDSF needs to be able to reach all children and adolescents in the country, due to which the final model has been planned for use with children up to 18 years of age. Given that what is sought is to really detect the presence of complex vulnerability factors, we can reasonably assume that the risk factors for adolescents between 16 and 17 years of age are sufficiently similar to those for the group aged 14 and 15 years, due to which we recommend that the same model be used for both groups" (Vaithianathan et al., 2019, p. 110).

This decision, moreover, added another problem: the information gathered during 2018 could have been modified retroactively, due to which it could be different from the information on hand as of the 2016 cut-off date. As the report says: "this problem of variables that include future information unknown at the moment (forward-looking variables) must be identified once the model is deployed in a territory using 'live' data flows, instead of those belonging to a set of research data" (Vaithianathan et al., 2019, p. 116).

With such considerations, a data set of approximately 3.9 million live children under 16 years old as of the cut-off date was obtained. The data set was randomly divided into two subsets: the training set (⅔ of the data) and the test set (⅓ of the data). The sample analyzed for the development of each of the five models, and its corresponding sub-sample chosen at random to evaluate its predictive ability is summarized in the following table.

Table 4. Row counting for the data sets used to train each model and test its predictive ability.

Source: Vaithianathan et al., 2019, p. 117.

Age	Training Data	Test Data	Total
0-3	653690	326943	980633
4-5	336059	167663	503722
6-13	1295704	647451	1943155
14-15	334161	167194	501355
Single Model	2619401	1309464	3928865

Variables

From the total data sources, 280 possible "characteristics" for each child and adolescent were collected, which were considered predictor variables in the models (also mentioned as Predictive Risk Indicators, PRI). A detailed list of these variables is found in Appendix 2 of the final report (Vaithianathan et al., 2019), but below they are specified by data source:

- 16 variables taken from the Office of Vital Statistics corresponding to demographic and family composition characteristics for each child and adolescent.
- 75 predictive variables extracted from SENAME data describing programs of which the children and adolescents or their families were beneficiaries.
- 32 socioeconomic variables for the children and adolescents and their families collected from the Social Registry of Households.
- 57 variables taken from the Ministry of Education associated with the enrollment and performance of children in public and private schools in Chile and educational background information for their families.
- 39 variables obtained from the "Chile Crece Contigo" system associated with risks during pregnancy and early childhood provided by public health centers.
- 24 variables associated with crimes in a radius of 300 and 1,000 meters around each child's home.
- 37 variables associated with social vulnerability indicators based on census data, also calculated at a radius of 300 and 1,00 meters around each child or adolescent's home.[34]

As mentioned in the data dictionary, the variables were coded as 1 or 0 to ensure compatibility with the different models used (the categorical variables were disaggregated in binary columns). All the missing values were replaced by 0. This may explain why a large part of the PRI have mean values close to 0. It is necessary to specify the number of valid responses and those not found for each variable. Binary columns were added to the model to indicate whether or not the information for the child/adolescent was found in the different data sources, from which it is deduced that in a large number of cases there are no data.[35]

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34 It is noteworthy that within this group of PRI, the data dictionary includes eight variables on characteristics of the neighborhood in a radius of 3,000 meters; however, these are not mentioned in the report. If the averages of these variables are reviewed, it would seem that there are data for only 1% of the sample.

35 For example, in the "Child/Adolescent not found in the risk bases for Chile Crece Contigo" variable, the average is 0.8. In the "Census data not found" in a radius of 300 meters and 1,000 meters variable, the average was 0.66. In the "Crime data not found" variable, the average was 0.66.

Another important point that stands out on review of the predictive variables is that they are focused on the mother or pregnant woman of the child/adolescent, while fewer variables are included related to the father. This can be explained because in systems such as "Chile Crece Contigo" it was possible to collect more information about the mother of each child/adolescent and thus there were more potential variables to include in the model. While this is not SAN's fault, the lack of variables on the fathers of children/adolescents must be addressed and presents a relevant challenge for the gender equity of the data used by the State.

In terms of the target variables that are attempted to be predicted by the models (predictive risk outcomes, PRO), as we mentioned earlier, these would be those that show that a child/adolescent had contact with child protection services of the SENAME system from July 1, 2016 to June 30, 2018.[36] According to the researchers, "these 'proxy' variables are the nearest observable indicating the violation of a child's rights" (Vaithianathan et al., 2019, p. 122). In other words, the models were trained to be able to predict if a child/adolescent would have contact with SENAME within a two-year timeframe, showing characteristics similar to the children/adolescents of the training set. This contact with SENAME takes place when there has already been a violation of the child/adolescent's rights or when adolescents have committed a crime. In turn, this contact with SENAME can be highly diverse, since a child/adolescent can be entered in different programs of SENAME departments, which the final report summarizes as follows:

Table 5. SENAME Programs and their description in the report.

Source: Vaithianathan et al., 2019.

Participation in a program:	The child has entered some program of SENAME departments in a two-year timeframe starting with the cut-off date. These include a wide range of preventive and restorative services that go from strengthening care and child rearing abilities in families and/or important adults and educational reintegration, to family separation.
Critical Program	The child has entered programs (residential or walk-in) that are associated with serious problems, such as therapy for sexual abuse, legal representation or requiring specialized intervention for extreme cases of negligence or rights violation.
Critical Child Protection Program	The same models as the previous variable but considering only programs initiated by the Department for Protection and Restitution of Rights. This excludes programs that have been initiated by the Department of Juvenile Justice, i.e., those who have been referred because they committed a crime.
Separação	Crianças que foram separadas de suas famílias e, por ordem judicial, estão vivendo em uma residência de proteção, ou com uma família de acolhimento (que pode ser extensa ou externa - uma família sem relação de parentesco com a criança). Também inclui crianças que estão em Centros de Internação Provisória (CIP) e internação em Regime Fechado (CRC) de justiça juvenil.
Child Protection Separation	The same as the previous variable but excluding children who have been referred to imprisonment programs of the Department of Juvenile Justice.

36 Another possible target variable mentioned in the report are the deaths of children/adolescents related to abuse, but these are infrequent and more complicated to predict, according to the authors. Furthermore, as the authors mention, it would be strange to say the least to communicate to at-risk families the results of a model trained on the basis of deaths (p. 122).

When all dimensions were tested, the model trained for Separation as the target variable showed the best performance and was similar for all age groups (Vaithianathan et al., 2019, p. 125), due to which a large part of the analysis is focused on that variable. An external validation process was also conducted to determine the precision of related target variables, for which the model had not been explicitly trained for prediction, but to which a well-calibrated PRM should be sensitive. For this they primarily used the death of children and adolescents by all causes. For older children (14–15 years old), they also used violent deaths and teen pregnancy (only for females) as a source of external validation.

Modeling

In terms of modeling the data, logistic regression and LASSO regression, Random Forest and Support Vector Machines (SVM) and Extreme gradient Boost (XGBoost) methods were explored using R open software. The codes have not be shared publicly. In the table below a summary of each model's specific performance can be seen, using different methods and age groups, and presenting comparative metrics tables principally using the area under the curve (AUC) and the true positives rate (TPR) or the proportion of positive cases that were correctly identified by the model.

Based on this comparison of each model's performance, the final choice was made for the prototype of the LASSO regression method due to its "simplicity" and for "practical reasons" (Vaithianathan et al., 2019, pp. 134–135). They also based the decision on prior experience where the LASSO method generally achieves performance similar to other methods for the modeling and is of better interpretability. The LASSO (Least Absolute Shrinkage and Selection Operator) regression method is a supervised statistical learning technique created in 1996 which allows the machine to continually learn which are the most predictive factors by penalizing or shrinking to zero any regression coefficients that are not significant, which in turn reduces variance. This regression analysis method is useful for times when there is a large collection of variables, thus automatically selecting the most relevant variables and improving the accuracy of the statistical model (See Tibshirani, 1996). According to conversations with individuals from the Undersecretariat for Social Assessment, up to now the SAN predictive tool executes the LASSO regression following the modeling defined by Vaithianathan et al. (2019).

Table 6. Specific performance summary (AUC) for age groups of the model in different methods and data sets.[37]

Source: Vaithianathan et al. 2019, p. 137-139.

	0-3 Age Group				4-15 Age Group				Single Model (all ages)			
	Excluding PRI from SENAME		Using all PRI		Excluding PRI from SENAME		Using all PRI		Excluding PRI from SENAME		Using all PRI	
	Training	Test	Training	Prova	Training	Prova	Training	Prova	Training	Prova	Training	Prova
Linear SVM*	0,651	0,592	0,738	0,646	0,615	0,569	0,720	0,679	***41	***42	0,943	0,912
Logistic regression**	0,727	0,731	0,812	0,814	0,895	0,887	0,938	0,929	0,854	0,851	0,938	0,934
LASSO	0,897	0,893	0,946	0,949	0,906	0,897	0,940	0,931	0,896	0,890	0,948	0,942
Random Forest	0,934	0,801	0,963	0,933	1,000	0,867	0,963	0,924	1,000	0,834	1,000	0,913
XGBoost	0,900	0,888	0,945	0,940	0,904	0,888	0,937	0,925	0,904	0,894	0,947	0,940

Analyzing the AUC, all the models using LASSO regression have a good performance in all age groups, arriving at values of between 0.88 and 0.95 depending on the model, showing acceptable sensitivity. In terms of the TPR, values are found ranging from 0.401 to 0.775 depending on the model and age group. The single model trained with children and adolescents of all ages, but used to predict the 14–15 year old age group, achieved the highest rate, which means that the best model managed to correctly identify (with the upper 5% of highest risk) a little more than three-fourths of children/adolescents who ended up being separated from their families in the following two years. If the TPR for the models are analyzed to predict mortality in the following two years, in general very low rates are found.[38] It is likely that these models may

37 Notes:
* Due to computational cost, the models were trained on a smaller, randomly selected sub-sample, corresponding to 10% of the data in the case of models by age group and % of data in the case of the single model with all PRI; due to computational cost, the single model with linear SVM was trained in Python with default parameter values.
** The models were trained on the pre-processed data set resulting from an analysis of main components, as previously mentioned in this chapter under the description of regression-based methods where the number of selected components is mentioned.
*** Keeping in mind that the linear SVM performance using all PRI does not surpass other methods, and due to the computational cost of training the linear SVM model for the single model, even using a sub-sample, this option was excluded from the analysis modeling.

38 The model with the best performance according to TPR is the single model for all ages without SENAME characteristics for the 14–15-year-old age group. Of the total number of children and adolescents who died within the two-year period, this model only correctly identified 35.6% of the children/adolescents as part of the upper 5% in the test data set.

be sensitive to predicting cases at highest risk, but even so they have a large number of false positives,[39] leading to case managers having to contact a large number of families who do not require services. This could be reasonable, as long as the objective is to identify the largest possible quantity of positive cases or those who will undergo separation in the future.

Table 7. Performance of model prototypes developed (summary table of LASSO models for prediction of the Separations variable).

Source: Vaithianathan et al. 2019, p. 21-22.

Combined test AUC				
Age group	0-3	4-5	6-13	14-15
Age-specific model	0,949	0,940	0,898	0,896
Single model for all ages without SENAME	0,888	0,879	0,892	0,882
Single model for all ages with SENAME	0,942	0,941	0,947	0,922

TPR separações (5%) Conjunto de teste				
Age group	0-3	4-5	6-13	14-15
Age-specific model	0,744	0,727	0,525	0,552
Single model for all ages without SENAME	0,401	0,456	0,522	0,632
Single model for all ages with SENAME	0,685	0,690	0,743	0,775

TPR mortalidade (5%) Conjunto de teste				
Age group	0-3	4-5	6-13	14-15
Age-specific model	0,170	0,086	0,154	0,221
Single model for all ages without SENAME	0,085	0,095	0,167	0,356
Single model for all ages with SENAME	0,116	0,048	0,152	0,252

Disparities

The report analyzes a potential bias toward population groups. It indicates that due to the PRM being backed by administrative data that generally over-represent families who are users of public social protection systems and tend to have lower income or education levels, there could be disparities by socioeconomic level. This leads to "the model possibly having reduced capability for identifying children at high risk from a higher socioeconomic level. In addition, it could increase the estimated risk of families from a lower socioeconomic level" (p. 147). The researchers argue that in the case of the Child Alert System, this would not be so concerning because the consequences of a high risk score do not entail negative consequences;[40] rather they would serve for voluntarily receiving welfare services.

39 Neither the confounding factor matrices nor the False Positives Rate (FPR)—the proportion of negative cases (children and adolescents without high risk of violation of rights) detected by the model as positive—are given. This metric enables analysis of the model's level of specificity, i.e., the model's ability to detect negative cases.

40 They offer as an example of potentially adverse or harmful interventions those that are caused by a repeat criminal offender tool intended to predict the probability of repeat offenses by a person if he or she is released from jail with the goal of defining parole. Another part of the report indicates: "programs intended to help the family could generate fewer ethical problems than those that are punitive" (p. 178).

To test these disparities, the researchers analyzed the socioeconomic classification (SEC) of the homes for each child/adolescent, but here errors start to appear, since as the report recognizes, there is a large volume of cases for which the household SEC is unknown. For the 0–3 years age group only half of the children present SEC, while for the 14–15 age group the rate is one-fifth, and for the single model, more than one-fourth (28.5%) of total children/adolescents. This shows not only the possibility of socioeconomic bias but also the difficulty of quantifying that bias. Nevertheless, they first reviewed the mortality and separations of children/adolescents in the two-year study and a marked socioeconomic slant is shown in which the lowest socioeconomic groups present greater mortality and separations than higher socioeconomic groups. Likewise, on evaluating the precision of the LASSO regression models on these variables, once again a socioeconomic slant is found in the identification of truly positive cases, i.e., of children/adolescents to whom the model assigned a high score (within the 5%) and who effectively were separated from their families in the subsequent two years. Ultimately, it shows that the models are more sensitive for children/adolescents in lower socioeconomic groups. They explain this by greater contact with government services in lower-income socioeconomic groups, making it more difficult for the models to determine the risk level for children/adolescents from high socioeconomic groups. Attempting to address this problem, the researchers tested excluding predictor variables from the SENAME data source, but they conclude that, except for the 14–15 year age group, this reduced the models' performance. Ultimately, the SENAME variables are highly predictive and would help make the models more sensitive for children/adolescents from poorer homes. For this reason, for example, at the MDSF workshop a recommendation is given that "first-line professionals be trained so they are aware of the model's reduced sensitivity for high socioeconomic strata" (p. 60).

The report ends with a few recommendations for the final model to be implemented at the OLNs. This would depend on "the compensation between the sensitivity to mortality, the sensitivity to separations and the calibration in different age groups" (p. 176). This last element is particularly relevant, if we consider that the Child Alert System was originally conceived of for the early prevention of violation of children/adolescents' rights—a very broad proposition—and that it is ultimately reduced in practice to predicting either the death of children/adolescents or if they will be separated from their families within a two-year timeframe. This leaves open many questions on whether the focus in the OLNs is to prevent the separation of children/adolescents from their families, preventing the death of children/adolescents, or other forms of their rights being violated that do not end up in death or family separation.

Implementation at the Municipal Offices for Children: "Just another input"

After finalizing the prototype and transferring it to the MDSF, a second stage of the Child Alert System is observed on analyzing its entry into operation at the Municipal Offices for Children. In this process SAN undergoes a series of transformations that expand its use beyond the predictive models, and which reduce the high aspirations it held at the start.

The OLNs' general objective is "to promote the enjoyment of children's and adolescents' rights and prevent situations of violation, with the goal of achieving the blossoming of their potential and their comprehensive development" (Undersecretariat for Children, 2019, p. 9). Their specific objective mentions, first of all, the management of access by children/adolescents and their families to services and benefits available in the local area. Second, they mention "Managing the activation and resolution of vulnerability alerts, using the 'Child Alert System', by service providers" (p. 9). Third, they seek "to strengthen protective factors within the family and mitigate identified risk factors, using an intervention known as 'Strengthening Families'." During the pilot at the OLNs emphasis has primarily been placed on the prevention function, understood as any action oriented to avoiding violation of rights or situations that threaten the personal integrity and comprehensive development of children and adolescents. To this end, the OLNs and their corresponding village network for children must produce an Annual Work Plan, an Offerings Map of benefits and services available in each territory; identify supply gaps for the effective enjoyment of children's and adolescents' rights; and design

action protocols for referrals and counter-referrals, to give timely access to children/adolescents and their families for the required services and benefits. Each OLN is composed of:

> A General Coordinator: charged with prioritizing a list of cases and distributing them among their team of managers.
> Case Managers: responsible for contacting the families of children/adolescents who have been identified as having risk factors, to conduct a joint assessment and develop a family care plan. These must be assigned at least 40 cases at a time.
> Family Therapists: dedicated to providing family therapy services known as "Strengthening Families" which consist of an intervention around family functioning topics, such as dynamics, bonds, relations and roles.

In addition to the OLN team, the role of sector specialists is noteworthy; these are professionals or technicians who participate in providing services, goods or benefits to the children/adolescents and their family group, and who participate in the Village Network for Children. Under the OLN structure, the sector specialists are responsible, on one hand, for entering territorial alerts on the SAN platform to refer the child/adolescent and his or her family to the corresponding OLN. On the other hand, they must provide services or offerings to those children/adolescents coming from the OLN to achieve actions that mitigate risk factors (Undersecretariat for Children, 2019, p. 20). In several of the reviewed documents, these four types of actors were described as SAN's main users, who must protect the confidentiality of sensitive personal data pursuant to Law 19.628 on Protecting Privacy, signing a Confidentiality Agreement for use of the information (p. 13).

In documents on the OLNs, the Child Alert System is continually highlighted as a targeting tool or instrument to detect risk factors threatening rights, and thus making it possible for the OLNs to provide timely, targeted attention to the cases that most call for mitigating such risk. Moreover, in some documents from 2018, the creation of the OLNs is nearly exclusively conceived of as providing a response to SAN warnings:

> The Undersecretariat for Children presents the Municipal Offices for Children, which will respond to warnings raised by the Childhood Alert System using a program of intensive, holistic and personalized accompaniment of the families of children/adolescents who show risk factors according to information provided by the System; and the coordination among the different institutions that work with and for children/adolescents who present risk factors, their families and the communities where they live, generating synergies in the local network that facilitate timely access to the current programmatic offer (Undersecretariat for Children, 2018, p. 1).

But in addition to the emphasis on a "preventive targeting," they began to talk about SAN as a "platform" for managing and recording all actions taken by case managers and sector specialists. The targeting instrument becomes just another component of SAN. In Chapter 3 of the OLN Technical Guidelines, the Child Alert System is described as follows:

> The Ministry of Social Development will make available to the Municipality implementing OLN the computer platform known as "Child Alert System (SAN)," designed for the prevention and detection of vulnerability warnings, in conjunction with the management of responses deployed in light of such detection. This System contains a targeting instrument and contextual information on a management platform that will enable identification of the children/adolescents with the highest risk score, as well as recording actions linked to case management and the family interventions that will be conducted in the context of the OLN. This System will facilitate the preparation of Reports, as well as quantify the service availability gap at the local level to respond with urgency and relevance to the needs of children/adolescents and their families. Moreover, the platform will have the goal of serving as a data repository related to the provision of services to which the children/

> adolescents and their families have had access, also enabling communication with sector specialists (health, education, work, disability, etc.) in terms of the management of vulnerability warnings and subsequent mitigation actions (Undersecretariat for Children, 2019, p. 21).

Case management

The specific role played by the predictive model within the OLN structure comes at the beginning of the whole case management process. SAN identifies eligible families with vulnerability warnings or who present risk factors and who have not necessarily requested aid to address needs in the family environment. SAN generates a list ordered according to a ranking or prioritization based on the risk score for each child/adolescent, which the person coordinating the OLN receives on behalf of the Undersecretariat for Children. In practical terms, SAN classifies cases of children/adolescents and their families as:

- "Does not apply" for those cases whose background indicates that (i) it is a situation where rights are being violated, (ii) they are in the court system or (iii) there is indication they are part of the SENAME Network.
- "To be assigned" for those cases included on the list, keeping a ranked order according to each case's risk score for violation of rights.

Using the case list, coordinators distribute the priority cases to case managers. The latter endeavor to invite the identified family to participate voluntarily[41] in the program. Case managers must make three attempts to contact the family within the following 10 working days. If it is not possible to locate them or if the invitation is rejected, the Coordinator assigns another family following the ranked order of the list. If the invitation is accepted, the case managers make a comprehensive assessment of the child/adolescent and his or her family, [42]conducting a home visit and an interview to then complete the University of North Carolina (USA) Family Assessment Scale (NCFAS-G[43]) or another instrument defined for that purpose. During the visit, the manager may incorporate new vulnerability warnings into the case or discard others.

The manager may also request that the data owner, father, mother or legal guardian for the child/adolescent, aged 18 and above, sign an Informed Consent form authorizing the use of personal information to assess entry into the OLN Program. In this regard, the model included in the Technical Guidelines is extremely unclear in terms of the kind of data processing involved with SAN and its predictive models. On the informed consent template, it is agreed that the MDSF:

> may use, verify and/or administratively supplement the data shared or gathered, in accordance with the information available, with information that may be provided by other public entities, with data shared and with any other data necessary for the targeting of services provided in the framework of the Municipal Offices for Children. Likewise, I authorize the Ministry of Social Development to process all this information pursuant to the provisions of Law 19.628, on Protection of Privacy, and

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41 Emphasis is placed on how one of the OLNs' guiding principles is to provide voluntary—rather than court-ordered—support from a promotional and preventive framework. This how avoiding coercion action is handled.

42 It is mentioned that the participation of their members in the process should be ensured.

43 According to the Technical Guidelines, "the NCFAS-G consists of a family evaluation scale from the University of North Carolina (USA), tested in Chile and abroad, designed to address needs for general services and which apply to all families. This scale offers an organizing principle for evaluating family functioning, identifying strengths and issues based on dimensions including Environment, Parental Capabilities, Family Interactions, Family Safety or Protection, Child/Adolescent Well-being, Social/Community Life, Self-Sufficiency and Family Health" (Undersecretariat for Children, 2019, p. 33).

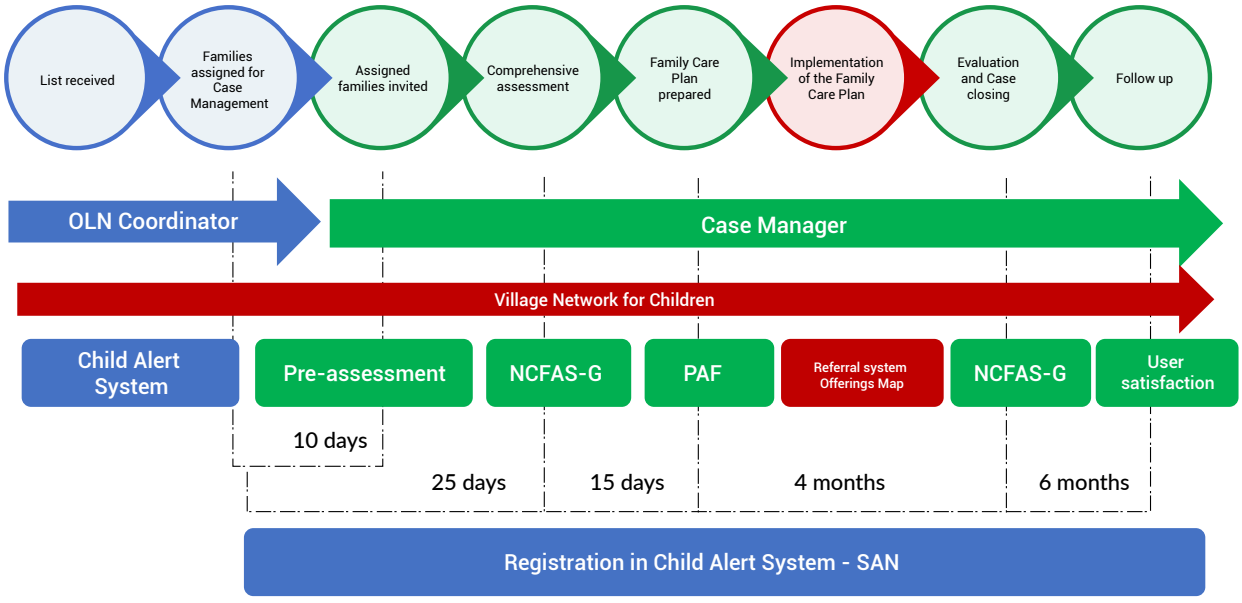
> other applicable legislation, and also for the purposes indicated in Article 4 of Supreme Decree 160 of 2007 of the Ministry of Social Development, which approves the regulation of the Social Information Registry (Undersecretariat for Children, 2019, Annex No. 7, p. 89).

That is, the processing of all data "necessary for the targeting of services" is described, without explicitly mentioning the algorithmic creation of lists or risk scores ranking the vulnerability of children/adolescents. Moreover, it is not clear if the manager, before or after the consent is signed, has access via the SAN Platform to the socioeconomic characterization and use of social benefits provided by the Social Registry of Households or the Social Information Registry (RIS).

Based on the assessment, the case manager must develop a Family Care Plan (Plan de Atención Familiar, PAF) with objectives and specific actions to mitigate the risk factors. This plan must be reported to and accepted by the family before coordination begins. After this process, there are several possible scenarios: the PAF is properly resolved, or difficulties are encountered in achieving the PAF, which involves conducting new coordination among the actors in the Village Network for Children. Implementation of the PAF can be extended for a maximum period of four months or it can be terminated early when the child/adolescent and his or her family gain access to the services identified in the plan. Once implementation of the PAF is finished, the case manager must communicate the Plan's closure to the family and once again apply the NCFAS-G to assess the PAF's achievement and see if the risk factors present in the child/adolescent and his or her family were mitigated. Furthermore, a Program Satisfaction Survey must be applied as input for the evaluation and future redesign of the policy. Finally, after the PAF has been closed, there will also be follow-up with the children/adolescents and their families using the SAN platform and telephone calls, for a period of up to six months. This is to monitor continued adherence to the program they gained access to via the PAF by the children/adolescents and their families, or to identify if they present other vulnerability alerts that could require restarting management of the case.

Formal flow model in SAN case management.

Source: Undersecretariat for Children, 2020b.



In the context of the different stages in the management process, the role of predictive models is reduced to conducting an initial classification using prioritization criteria to establish an order in which cases will be handled. The risk score is shown in a column together with other columns such as those for territorial warnings and "Chile Crece Contigo." While calculation of the lists already restricts the universe of possible children/adolescents to attend to, following the order of priority estimated by the predictive tool depends on the coordinator and the case managers at each OLN. It is for this reason that more recent documentation describes SAN as a "support" or "supplement" to the information the OLNs gather in the territory for the selection of beneficiaries and subsequent early deployment of actions (see AUT & UAI, 2019, pp. 8–10; Undersecretariat for Children, 2020; MDSF Public Report, 2020). This highlights that the decision in which predictive models intervene—which children/adolescents to prioritize in preventive care—are always subordinate to the human decisions of the coordinators and case managers, where the predictive instrument is just another input among various factors analyzed in the decision.

System maintenance

To date, SAN maintenance has been conducted by two external Chilean firms under a Framework Agreement modality. From October 2018 to July 2020, various purchase orders[44] have been recorded by the Undersecretariat for Social Assessment in favor of Actis Ltda. for maintenance and extension of the Child Alert System. Everything indicates that Actis was responsible for implementing the final predictive models within the undersecretariat. As described in Exempt Resolution 457, Actis "is who best knows the system's design, it modeled the Database, functions, procedures and provided the service." More recently, in September 2020, a new purchase order was approved[45] for the corrective maintenance of SAN during 2020 and 2021, this time awarded to the MMAsesorias company.

In the documents associated with these procurements, the hiring of three professionals is specified (Chief of Project, Senior PHP Developer and Junior PHP Developer), and technological guidelines are defined as having the system consider the PHP programming language with Laravel Framework and for the database to be based on Oracle and the PL/SQL programming language. Likewise, it is mentioned that, as part of the MDSF systems development policy, a vulnerabilities scan and analysis should be conducted on the systems prior to their implementation. It is indicated that they will use the QualysGuard Vulnerability Management tool from the California-based Qualys company, which would produce vulnerability reports using a scale from 1 to 5. Moreover, in this corrective development, the expansion of SAN beyond a mere targeting instrument is clearly shown. For example, the technical proposal from Actis dated September 2018 indicates:

the childhood alert system will have an information system to identify and determine which children/adolescents are at risk and a programmatic offer that addresses that risk. This system will receive the alerts iden2tified by the preventive targeting tool which, using analysis of administrative databases and Big Data methodologies, classifies each child/adolescent according to his or her threat risk. The information system will have a unique platform that will enable management of the alerts and facilitate case management. Taking into account the information provided by the targeting instrument, information about the environment and its characteristics, information provided by social indicators for follow-up and evaluation, information on the external offering, information associated with local feedback and information associated with the management process (Actis Ltda., 2018).

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44 730566-692-CM18 (Send date: OCT-10-2018) for 737.30 UF; 730566-1148-CM18 (Send date: DEC-27-2018) for 977.28 UF; 730566-250-CM19 (Send date: MAY-02-2019) for 1,738.72 UF; 730566-115-CM20 (Send date: MAR-20-2020) for 941.32 UF; 730566-221-CM20 (Send date: JUL-15-2020) 307.24 UF.

45 730566-210-CM20 (Send date: SEP-14-2020) for 2,812 UF

The above reinforces what has already been mentioned about how SAN has ceased to focus exclusively on the predictive instrument, since the latter is just one more among several components and factors used to prepare the lists for case managers. Understood as a platform, SAN includes recording in that computer system all actions within the case management process, due to which in the procurement-related documentation, SAN's functions are described as the viewing of the record for each child/adolescent with a drawing of his or her home, the child/adolescent's referral to managers and therapists, monitoring of cases under management and the development of both family care plans (PAF) and family therapy plans (PTF), management of referral and counter-referral, the recording of territorial alerts and territorial coordination, analysis of gaps and administration of the Offerings Map for the area, mechanisms for georeferencing for the children/adolescents by manager, a schedule for managers for planning visits, functionalities for reporting results and analysis, and integration with other systems (RSH-Social Registry of Households, SSO, CCC-Chile Crece Contigo, Office of Vital Statistics, RIS-Social Information Registry).

Evaluation

In conjunction with the implementation of the OLN pilots, a policy evaluation plan was prepared. During 2019, the Undersecretariat for Children began a "Reimbursable Advisory Services Project" with the World Bank to support the process of designing and implementing the OLN pilots, along with having to deliver an Implementation Evaluation Report on the pilots. Likewise, in January 2020, a Collaboration Agreement was established with the United Nations Development Programme (UNDP) to conduct an Impact Evaluation of the OLNs, seeking to determine the effects that the intervention strategy had on families, especially interventions based on family therapy. The development of that strategy had technical assistance and supervision from the Chilean Institute for Family Therapy (Instituto Chileno de Terapia Familiar). Finally, the Laboratory of Public Innovation of the Pontificia Universidad Católica de Chile, with support from UNICEF, prepared a proposed Municipal Office for Children Management Model.

Speaking specifically to the evaluation of SAN's predictive instrument, in an interview with members of the Undersecretariat for Social Assessment mention was made of hiring the Spanish consulting firm Eticas Consulting to conduct an algorithmic audit of SAN and evaluate possible biases in the ranking order of the lists of children/adolescents. According to their versions, this work was financed by the IDB. However, to date there is no further information in this regard on the indicators or evaluation criteria, the feedback mechanisms contemplated in this audit, or its results. The effects of the audit's recommendations on the modeling are not known, either. Likewise, the future frequency of this kind of algorithmic audit of SAN is unknown.

This kind of audit is in line with the Inter-American Development Bank's recommendation during debate on the National Artificial Intelligence Policy. A recent document explicitly mentions that in conjunction with promoting the use of AI-based tools for improved monitoring of public agencies, there must be "development of regular algorithmic audits in social programs (such as Child Alert) and capacity building on implementing teams" (Martínez & Vega, 2020, p. 40).

Status

As mentioned earlier, we were denied specific information on the current status of SAN's implementation. According to available documents, as of January 31, 2020, 1,529 families had been assisted within the OLNs, at different stages of the process and with a total 1,765 children/adolescents benefiting. Likewise, in the family therapy component, a total of 314 families have been assisted, benefiting a total of 354 children and adolescents.

Table 1: Number of families under case management, by stage in the process

Source: Undersecretariat for Children, 2020.

N° de famílias							
Municiipio	Casos em gestão	Em pré-diagnostico	Em diagnóstico	Em elaboração PAF	Em execução PAF	Em avaliação PAF	Em monitoramento PAF
Aysén	131	44	11	8	54	1	13
Cauquenes	113	11	19	5	69	3	6
Colina	108	2	26	13	58	3	6
Concepción	121	8	42	4	49	3	15
Iquique	80	0	35	7	38	0	0
La Florida	178	0	133	10	21	12	2
La Serena	147	42	25	68	5	7	0
Nueva Imperial	137	12	23	2	59	7	34
Quillón	117	57	21	22	15	2	0
Requinoa	120	12	21	4	49	3	31
San Felipe	117	76	12	2	27	0	0
Santiago	160	109	18	8	25	0	0
Total	1529	373	386	153	469	41	107

In the Ministry's Public Report (MDSF, 2020, p. 12), more recent data (as of August 2020) are provided, indicating that 3,354 children and adolescents are being served in the villages where the country's twelve pilot OLNs are operating. However, no information relevant to evaluating the performance of the predictive instrument as part of OLN implementation was provided. It is unknown which models were ultimately chosen by the MDSF, and access to the predictive tool's performance indicators in operation has not been provided. Alleging the possible identification of subjects, permission was also denied for knowing the distribution by sex, age, socioeconomic level, migrant population or disability of all the children/adolescents who appear at risk of rights violations as reported by SAN and who are currently being managed on the platform.

In response to the request for percentages of children/adolescents whose risk score increased, held steady or decreased as reported by SAN in the last six months, we were told, "The Undersecretariat does not have information available on the calculation of percentages; therefore, it is not possible to deliver it" (p. 6). Thus, it can be concluded that the Undersecretariat itself is not analyzing basic information to assess whether or not the children/adolescents improve in terms of their risk scores over time. We were informed that, of all the children/adolescents who are currently under intervention as of November 2020, around 11.2% correspond to territorial alerts raised by village sector specialists; 32% were identified by alerts arising from the "Chile Crece Contigo" System; and 56.8% were identified using the Child Alert System predictive instrument. Once

again this leads us to emphasize that the predictive instrument is just another input allowing the managers at the offices to prioritize cases in conjunction with other types of alerts.

Given the Undersecretariat for Children's wariness, it was not possible to know whether they have recorded cases of abuse or negative consequences as a result of SAN's implementation. It is also unknown how much of the review of ethical frameworks and international experiences came to permeate the current implementation. As with any predictive model, there are false positive and false negative errors. In the case of the SAN predictive instrument, the false positives would be those children/adolescents who were assigned a high risk score and were ranked among the first on the list, but who did not have a real risk of having their rights violated. This could be damaging if we consider that their families, without have requested assistance or any services in this area from the State, could be contacted by a case manager indicating that the children/adolescents showed a high risk of having their rights violated, thus potentially generating conflicts within the family. Up to now, there has been no information on reparation protocols or mechanisms for such cases, beyond the family being able to refuse being assessed and the case manager deciding to close the case and move on to the next one.

Future

During the 2020–2022 period, the Child Alert System and the OLNs are expected to be expanded to more villages, with the long-term objective of national deployment. Regarding the predictive instrument itself, it is hoped the methodology will be strengthened and the modeling perfected to increase its accuracy, enabling identification of at-risk children and adolescents with greater precision. However, in conversations with actors at the Undersecretariat for Social Assessment, we were told that due to budget issues and MDSF priorities, this improvement of the model is not a priority at this time.

Furthermore, during 2020, with support from the Inter-American Development Bank, an external audit of the instrument was being conducted to identify potential spaces for improvement (MDSF, 2020, p. 34). In parallel, the end of the OLN Implementation Evaluation conducted by the World Bank and the beginning of the Impact Evaluation, which has technical assistance from the United Nations Development Programme (UNDP), are anticipated. Moreover, the second component budgeted for the OLNs, corresponding to the promotion of the effective enjoyment of children/adolescents' rights is expected to start, which will be conducted via a new action line item called "Community Management" (Undersecretariat for Children, 2020).

CRITICAL EVALUATION OF THE CASE

First, the order of events is noteworthy. As we have seen, the Child Alert System was conceived of even before entering government; it was put up for tender and design in 2018, while the institutional structure it would use was created in 2019. In other words, first the instrument, then the policy; first the predictive algorithmic system, then the staffing and offices for managing cases of children/adolescents. This suggests a strong determination of social policy by the technological aspect, the issue being that as the OLNs grew and increased in complexity, the role of the predictive instrument began to decrease in importance.

A second aspect to highlight is the tender and evaluation process for SAN, which seems tailored to the sole bidder and which during the bidding process itself records meetings and seminars with ministerial authorities. What's more, the bidding process did not include criteria for data ethics, transparency or justice. The specific objective for the counterpart is established as the review of ethical considerations and recommendations, but no mention is made of these by the Undersecretariat from the start, nor ethical guidelines that must be followed in the design and development of the system or fines in this regard. This demonstrates the urgency of including minimum regulatory criteria for the regulation and protection of human rights, going beyond the mention of non-compulsory guidelines (See Lara Gálvez, 2020). It is also urgent to establish accountability procedures from the start in processes for procurement of ADM systems by the State. While in the press the Undersecretariats for Children and for Social Assessment indicated that they had taken all precautions to conduct "safe, ethical and transparent information processing" (Candia & Bown, 2019), to date there is no information publicly available with regard to regulations or requirements in this direction.

A third aspect to consider are the descriptions of SAN that shift between the concepts of "targeting" and "predictive risk models." The idea of a "targeting instrument," emphasized from the tender process on, seems to respond to an attempt to frame the development of predictive models under the legal authority of the Undersecretariat for Social Assessment and the MDSF. Article 3 of Law 20.530 establishes as one of the MDSF's roles "...defining targeting instruments for social programs." But are we not then facing a new way of thinking about the justification for social spending? It is contradictory to speak of targeting when we are facing models designed to calculate future probabilities of rare events based on alerts or past events in the life of children/adolescents, their family members and environment. It is not about the development of poverty or current vulnerability brackets, but rather the prediction that events may occur for individuals in a cross-cutting manner and through a training set, without strongly following a theoretical hypothesis. More relevant notions such as predictive analytics or risk prediction models, repeated in the system design (UAI & AUT, 2018, Vaithianathan et al., 2019) came to be reformulated under ideas such as "early warning" or "preventive targeting" systems. This use of the semantics of targeting when talking about predictive systems becomes especially relevant when we note that the Undersecretariat for Social Assessment plans to develop new early warning instruments within this shift from the reactive to the preventive in public policies. For example, since September 2019, a predictive system for school dropouts has been implemented for the Ministry of Education (MDSF, 2020).

Linked to the point above, the use of the "targeting" label, present in the informed consent template previously reviewed, is insufficient to describe and explain the type of data processing to which children/adolescents are subject with the Child Alert System. The final report by Vaithianathan et al. (2019) discusses consent and suggests going beyond legal requirements to achieve a social license:

> While some data can be collected using forms indicating that the purpose is to provide care and services to an individual or family, this general objective does not necessarily mean that a person has consented to their use for PRM. It could be argued that the execution of an algorithm is an additional action requiring distinct consent. However, in Chile, this aspect is less relevant because

> citizens have for decades explicitly accepted that their data may be used to stratify their socioeconomic position when they register with the Social Registry of Households (ex-Social Protection Form). This practice has had strong social license due to the benefits it entails for families in need. (Vaithianathan et al., 2019, p. 78).

This quote recognizes that the execution of predictive models could require a consent form separate from that given to the MDSF to fulfill its targeting powers, but it becomes problematic if we consider that SAN includes information from families who have not voluntarily declared their consent to be included in the Social Registry of Households; and even if that were the case, the RSH social license cannot be considered comparable to approval of a system based on predictive models on the future of minors.

A fourth element to emphasize is the performative role that SAN may have on vulnerable families. Given that this tool generates a risk ranking of future threat to children/adolescents for cases in which their families have not necessarily requested a benefit or service from the State, the way that case managers communicate and make contact with families becomes key. Beyond the establishment of voluntariness as a service principle of the OLNs, it becomes important to question how the families interpret being contacted by case managers without having requested it. Contact can be perceived as an invasion of privacy, a stigmatization or it could lead to producing new conflicts within families, which are neither recorded nor treated if the family rejects OLN aid.

A fifth noteworthy aspect is SAN's opacity under the use of the "pilot" figure. On various occasions, officials from the Undersecretariat for Children indicated that it was complicated to provide more information about a tool that is not yet completely consolidated, when it is precisely in a technology's testing period that it should be the most open to public scrutiny and to testing its preliminary results. Otherwise, the tests conducted will not have the legitimacy necessary for its future implementation. This figure of the pilot has been wielded as an argument for not giving interviews or additional information on external evaluations or performance indicators for the predictive instrument.

This last item is noteworthy if we consider that the OLN initiative has already spent more than a year and a half in pilot phase—the signing of the agreement for the first OLN in the La Florida municipality was in March 2019. This extended pilot phase seems to be due to the Childhood Guarantees System Act remaining under processing. In a session of the Civil Society Childhood Council (Consejo de la Sociedad Civil de la Niñez), Mauricio Carreño, Head of the Childhood and Family Programs Department of the Undersecretariat for Children, stated that as the Guarantees Act is still in the processing stage, the OLNs have not been able to be legally created, and thus they have been implemented as a pilot test, and only in their preventive role, using the Child Alert information to detect risk factors and address them through case management and family therapy. Therefore, there is still no legal framework for the formal existence of the OLNs and thus, SAN.

Within this opacity, the absence of public documentation on the operation, performance and effects of SAN's predictive models is worrying. If we take as a reference Vaithianathan's work on the development of predictive models for New Zealand's Ministry of Development or Allegheny County, a series of academic articles and documents has been published in this regard. Likewise, they underwent exhaustive independent ethics and impact evaluations. In the case of the Child Alert System, its closed nature to these types of processes and public documentation that would aid in the instrument's greater legitimacy is concerning. Even for passive transparency mechanisms, we were denied access to information that is of particular relevance for evaluating potential biases in the data and studying if there is any level of negative affectation for specific groups or populations. This is aligned with the very recommendations made by the UAI and AUT researchers when they indicated in the MDSF workshop the need for the Ministry to "make available a public document explaining how privacy of the data and the scores is maintained, and whether families can see and correct

data about themselves" (p. 60). This would be the minimum for not leaving unheeded the series of values that should be followed in the project, such as transparency and accountability.

In addition this need for public documentation, the absence of participatory or citizen consultation processes is noteworthy in SAN's development and implementation. The tender process only established a consultation process with experts to identify practical and ethical considerations and recommendations for the instrument, which exclusively frames this under a technical discussion. Besides that, the expert consultation was poorly conducted in the work of Vaithianathan et al., 2019, failing to achieve a diverse sample. And despite recommending that the MDSF conduct an expanded expert consultation in the future, there is no information showing such was done. Neither is there any record of an on-going and truly participatory process in subsequent stages following SAN's implementation. SAN's users are constantly described as being the sector specialists and case managers, and accordingly, the evaluation is focused on the opinion of these actors, not on the children/adolescents and their families. No instances are known of communication with the population at large on how SAN works or mechanisms by which children/adolescents and their families may become familiar with, discuss and provide feedback to the project. Contrary to the principle of participation of children/adolescents that is set forth as guiding the OLNs, SAN has no demonstrated encouragement of spaces for children/adolescents and their families to form their own judgment and express their opinions regarding the preparation of lists ranking their risk of having their rights violated.

Sixth, it is necessary to ask about the use of databases in systems like SAN. As we saw with the predictive model prototypes, a huge variety of data sources was accessed to maximally increase SAN's predictive power (UAI & AUT, 2018). Currently the system is fed by data from the Ministry of Social Development and Family, and in particular from the Social Information Registry.[46] This registry contains data on the families and individuals who "currently or potentially" are beneficiaries of public services and programs, on the benefits provided by same and on their socioeconomic conditions. With this, the RIS contains information on potential beneficiaries who perhaps have not solicited or have not declared their intent to be included in the Social Registry of Households, but who would equally have access to benefits. To this end, the RIS integrates information from various institutions as well as from all municipalities and ministries via "collaboration and connectivity agreements," coming to cover an even greater percentage of the population than the RSH. This means that, via the RIS, SAN can access a vast quantity of databases from other ministries, corporations and agencies, as well as from all municipalities. This presents various conflicts that go beyond the system's efficiency. On one hand, by integrating information from other databases, a clear understanding of the scope and processing of personal data can be lost when it comes to requesting consent from children/adolescents and their families. On the other hand, it becomes important to ask if it is necessary to centralize and process more sensitive data from the children/adolescents in a single computer system to generate better predictions, if in practice the system plays an initial role within a more complex process of case management. And even when highly predictive inferences are achieved, it becomes critical to review the system's proportionality and social legitimacy.

Another data-related question involves the territorial alerts raised from the municipalities and government assistance center officials themselves. This is a very important database that according to conversations with members of the Undersecretariat for Social Assessment, up to now has not been included within the predictive instrument's modeling. These alerts are SAN's own database, and they are not systematized in other databases. However, to date these data are not included in establishing the children/adolescents' risk, since

46 Database created in 2004 by Article 6 of Law 19.949, administered by the MDSF, whose goal is: "to provide the information necessary for the allocation and justification of social benefits awarded by the State; the study and design of social policies, programs and benefits, as well as local development plans and statistical analyses that the administration of social benefits may require" (Law 19.949).

they are data created after the model's creation. These data would be very valuable since they are produced in a lower or territorial layer, and so they are closer to the children/adolescents' context, due to which in the future they could feed the model with such information.

Seventh, in terms of the modeling, and given the previously mentioned opacity surrounding SAN, we only had access to information on the prototypes. While we were told that due to budgetary issues and MDSF priorities, the modeling has not been significantly modified, doubts remain regarding the ministry's resolutions on methodological decisions taken in the AUT and UAI project. It is unknown whether or not SENAME predictors were added, whether the cut-off was defined at 5% or 10% of highest risk, or how the question of having to set the age limit for children/adolescents at 15 years or younger for the cut-off date was resolved. We suppose that the MDSF must be applying this model for all minors under age 18, believing that the age groups would be comparable. Moreover, it is unknown whether the target variables managed by the MDSF correspond to separation of children/adolescents from their families or to others such as mortality or others analyzed, such as teen pregnancy. The AUT and UAI researchers themselves recognized that there are important decisions on how to implement the algorithm that could affect its performance.

One last aspect, which is the one most urgently requiring review, are SAN's potential biases according to socioeconomic level. As we have seen, the existence of a steep socioeconomic slant is recognized both in the target variables to be predicted and in the prediction process itself. While this once again lays bare the country's deep inequalities, SAN can end up helping perpetuate these differences. The problem of lack of administrative data—as we saw with the lack of data on socioeconomic classification or the under-representation of certain groups in the SENAME data—leads to a lack of sensitivity in SAN to be able to predict the risk to children/adolescents from homes with high socioeconomic levels. At the same time, if we consider that the model incorporates a series of predictive variables according to geo-referenced data, it could produce a possible stigmatization and over-intervention for certain neighborhoods versus others. If the predictive variables for vulnerability and crime per neighborhood are observed, we see that the modeling includes variables such as the number of burglary cases, average years of schooling, house and car larceny, percentage of single parent homes, family and sexual violence, unemployment rate, homicide and rape, drunkenness and brawls, and drug consumption. It is to be expected then that the model assigns a high risk score to children/adolescents from poorer neighborhoods, where all these variables intersect. And by raising more alerts in these neighborhoods, it could lead to more cases of children/adolescents being managed in the area, implying a greater number of case manager visits and with it, a higher number of vulnerability alerts in the area, potentially creating harmful feedback loops (O'Neil, 2017). Likewise, it is necessary to study other possible disparities and biases that were not addressed, at least in the final report from Vaithianathan et al. (2019), such as sex or region.

CONCLUSIONS

Governments around the world are beginning to adopt ADM and AI systems in their decision-making processes, raising urgent concerns about the political and ethical implications. In this case study we traced the social life of the "Child Alert" computer system at Chile's Ministry of Social Development and Family. This case offers special considerations since it deals with predictive models on the future of minors. Briefly summarizing the debate, it is possible to distinguish a first moment involving academic actors from both Chile and New Zealand, emphasizing SAN's predictive capabilities. Later, during its implementation and integration into the Municipal Offices for Children at the local level, new capabilities are added, and a complex flowchart of socio-technical decision-making is sketched out. Weighing the human component in decision-making and combining the prioritization of predictive models with other input such as territorial alerts seems to be a good remedy against the risks of completely automating SAN. The over-expectation that a technological system was going to be able to "get there first" in terms of child protection becomes more complex in practice, but the attempt could be worth it. However, the level of opacity surrounding SAN must first be overcome, with full and clear documentation being published on it. It is important to be specific about what it is attempting to predict and which methods and data sources it uses. It requires considering the specificities of creating predictive models that require defining different measures from those that are available with a traditional targeting instrument. It must make it possible for citizens to understand its operations and counter results in cases where they disagree, as well as opening itself to public audit. In this manner, predictive risk models and analytics, like SAN, challenge us to rethink the justification of public spending, the definition of consent when providing personal data, the performativity of predictions and the understanding of fairness in a datafied world.

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