



CHILE URBAN CRIME PREDICTION SYSTEM:

Algorithmic production of
surveillance and control zones in
the city

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ACRÓNIMOS

ACIPOL	Academia de Ciencias Policiales / Academy of Police Science
AI	Artificial Intelligence
AUPOL	Automatización de Unidades Policiales / Police Unit Automation
BUD	Banco Unificado de Datos / Single Database
CEAMOS	Centro de Análisis y Modelamiento en Seguridad / Security Analysis and Modeling Center
CMSS	Crimes of major social significance
DAC	Departamento de Análisis Criminal / Crime Analysis Department
DNOS	Dirección Nacional de Orden y Seguridad / National Directorate for Order and Security
OIP	Oficina de Integración Comunitaria / Office of Community Integration
OO	Operations Office
PACIC	Plataforma de Análisis Criminal Integrado de Carabineros / Carabineros Integrated Crime Analysis Platform
PDI	Policía de Investigaciones / Investigations Police
SAIT	Sistema de Análisis de Información Territorial / Territorial Information Analysis System
STOP	Sistema Táctico de Operaciones Policiales/ Tactical Police Operations System

EXECUTIVE SUMMARY

The case at the heart of this investigation is the “Urban Crime Prediction System” developed by the Security Analysis and Mathematic Modeling Center at the Universidad de Chile, together with the Crime Analysis Department of the Carabineros de Chile (the uniformed Chilean national police force and gendarmerie), and implemented at 58 precincts around the country. The system’s objective is to predict the areas at greatest risk for the occurrence of crimes, to guide preventive police patrolling in the city efficiently and effectively, defining areas of increased surveillance and control. This report offers a socio-technical analysis that covers the design, implementation and evaluation of the system, through a documentation and literature review, analysis of the data and algorithms used, and interviews.

With the goal of contextualizing the case study, the first section presents the country’s sociodemographic and institutional panorama in terms of security and technology issues. Then, the social construction of the prediction system is described, analyzing associated narratives, materialities and practices starting with the ideas triggering its development and following through to its incorporation in daily police work. Throughout, it can be seen how plans are overtaken by lived experience, highlighting the importance of the context with which the system and its potential risks in terms of ethical and human rights issues are intertwined.

Based on this exploration, a synthesis of three critical aspects of the system is presented: 1) data production in the police context; 2) evaluation and transparency; and 3) predictive surveillance and control in a segregated urban context.

Regarding data production, this investigation detected a series of inconsistencies and problems. On the one hand, the way in which data are collected and preserved in the AUPOL system affects their integrity, as shown in the audit conducted by the Office of the Comptroller presented in Section 3. On the other hand, there are problems related to the kind of police data used (complaints and crimes of major social significance) linked to potentially irregular procedures such as wrongful or arbitrary arrests, or over- or underestimated crime reports. This could lead to the database being biased and reproducing discriminatory practices, especially in the application of preventive identity checks. Finally, and cutting across the above-mentioned points, it has been possible to detect that there is no evaluation protocol or external audit of the Carabineros’ data collection practices, a procedure that is a central part of police practices, guiding both their daily activities and evaluation of their operations’ results. Incorporating this kind of audit is fundamental to improving the process in both technical and social aspects. All the areas mentioned produce “dirty data” in the prediction system, i.e., data subject to forms of uncontrolled manipulation that complicate the system’s socio-technical operation.

In terms of types of evaluation and transparency, it was evident that the only existing form of evaluation are internal audits whose technical functionality is defined based on pre-set levels of prediction. However, there is no clear way to detect system errors, nor has any mechanism been implemented to evaluate the technology’s usefulness for its proposed purpose. Moreover, no

external audits or evaluations by government or civil organizations have been conducted, and citizen engagement mechanisms have not been implemented. This is linked to a widespread problem with the police forces rooted in the lack of transparency and civilian control over them and their procedures. In addition, and despite international evidence, it is deeply worrying that the Carabineros do not believe the model could have any impact on individual rights, such as ethical or intrusive issues related to surveillance, simply due to the fact that it does not use personal data. However, in the predefined patrol areas, surveillance and control are intensified; combined with criminal profiling, this could lead to discriminatory practices in the red zones toward people who have committed no crime but whose behavior is considered suspicious. This runs counter to the presumption of innocence, equality before the law and freedom of movement. Thus there is a policing policy that could affect human rights but which to date cannot be evaluated due to the lack of disaggregated data, transparency and external evaluation mechanisms.

Finally, in an urban context marked by socio-urban segregation, we must reflect on the consequences that the production of algorithmic mappings can have on each territory's inhabitants, since space can be a proxy for social categories such as race, class and ethnicity; especially in a scenario of inequality and in sectors where the residents have to deal with a life characterized by non-stop policing. While the use of predictive analytics offers the possibility of decreasing discriminatory biases in police practices, this will depend on the data underpinning the system and, above all, on the context into which they are incorporated. The local landscape is fairly complex on both points. Incorporating this kind of predictive mapping in this context can entrench and legitimize policing practices that discriminate along racial, class and national lines, by creating new rationales to justify differential policing practices.

There is an urgent need to define ethical protocols and methodologies for internal and external evaluation of the system's algorithmic impact from an intersectional and human rights perspective in order to evaluate not just its technical operations but also its results and expected social impact, as well as the potential risks for human rights. To this end, interdisciplinary teams must be created to design and evaluate these systems in their different fields, and to initiate citizen engagement processes that involve those who could be most affected by the systems' implementation. In turn, in the midst of the constitutional process, it is imperative to rethink the current idea of security where maintaining order is prioritized over care and respect for human rights.

1. INTRODUCTION: ARTIFICIAL INTELLIGENCE FOR FIGHTING CRIME

Can you imagine it's possible to predict crimes such as theft, muggings and murder? It sounds like science fiction, but it is more real than it seems. The Carabineros already have modern software created by Chilean scientists that is able to mathematically calculate where and when a crime could occur.

Matías del Río (2017) 24 Horas Central, TVN¹

On a Chilean news program, scenes from the science fiction movie *Minority Report* (Spielberg, 2002) introduce the crime prediction software developed by the Security Analysis and Mathematic Modeling Center (CEAMOS) at the Universidad de Chile, together with the Crime Analysis Department (DAC) of the Carabineros de Chile. The movie, based on a short story by Philip K. Dick (1956), introduces a world where crime can be predicted before it happens thanks to the prophetic abilities of three young people, who are exploited because of these abilities. The same film reference also introduces the academic publication written by the engineers, mathematicians and Carabineros to present the prediction system they developed. In their own words,

“Science fiction had anticipated the prediction of future occurrence of crimes. In fact, that prediction is actually possible. It can be done with some imprecision and by computer algorithms using available data from various sources. The prediction involves approximate time and risk maps of occurrence of certain type of felonies such as home burglaries, armed robberies and violent thefts. The police can then use this information for increasing their patrolling accordingly and thereby reducing the crime occurrence rate” (Baloian et al., 2017, p. 2).

This is not the first time that this movie has been referenced in regard to predictive policing systems. In fact, it is frequently mentioned in the context of the United States, where implementation of these technologies has spread (Brayne, 2021; Scannell, 2019). The reference offers a glimpse into the transnational links and mental images associated with this kind of system. Beyond the differences, there is an interesting similarity between science fiction and artificial intelligence systems such as those developed in crime prediction technologies: both work based on the construction of representational models. In the words of one of the creators of Siri, Apple's intelligent assistant, “for AI systems, what ‘exists’ is that which can be represented” (Gruber, 1995, p. 908). This means that each AI system is based on the construction of mathematical models that can represent a process in an abstract and simplified manner and trigger responses to diverse situations according to this predefined knowledge (O’Neil, 2016). As a result, each model reflects and reproduces the context and the ideas of those who build it.

¹ Available at: https://www.youtube.com/watch?v=k-_OQ4yWW-k.

The range of forms that AI technologies can take is broad and malleable, from the use of advanced statistics to machine learning for automating decisions in various areas. In all its versions, the use of big data feeding the system to build its representations or models is essential. Due to the diverse forms it takes, we must conscientiously ask ourselves how an AI system is built, where it is incorporated, who is affected by it and how its risks and benefits are distributed; that is, what are its social, political and ethical implications, and where should its use be limited (Crawford, 2021). This is because the systems are incorporated and participate in the automation of decision-making in public institutions such as, for example, the performance rating of teachers, the evaluation of possible parole, having access to some kind of social welfare (O’Neil, 2016; Valderrama, 2021) or, as we shall see in the present case, the definition of areas for increased police surveillance and control.

The use of these technologies tends to be driven by the need to make work more efficient and to improve resource use. Often they are installed without questioning, thought of as objective, neutral technologies. However, since they are representations created by people, they will always carry a complex history, reproducing perspectives that are often biased and potentially discriminatory. Researchers from various disciplines have questioned and analyzed these systems’ consequences in terms of inequality and social exclusion, proposing ideas like “algorithmic oppression” (Noble, 2018) or “automation of inequality” (Eubanks, 2017), to explain how they have tended to punish people in situations of poverty, people of color and other traditionally excluded groups. This makes it even more necessary to conduct evidence-based research to study the contexts in which these technologies are implemented and their consequences, in particular the risks they pose.

AI systems tend to be thought of as “black boxes” since it is complicated to reach inside their structure, given that many of their algorithms are private or the processes are hard to understand even for those who program them. Despite this, it is possible to study their consequences from a situated perspective that explains how the algorithmic systems operate in practice; to track their processes from design to implementation; and to analyze both the accompanying narrative and their materialities (Seaver, 2017).

One of the forms that AI use can take is crime prediction. Crime prediction or predictive policing² is defined as any system that analyzes existing data to forecast criminal events. It can be divided into two types: location-based or person-based. The first covers any system that predicts where and when there is greater risk of crime occurring, while the second defines who has the greater likelihood of being a victim or the author of a crime (Richardson, Schultz & Crawford, 2019). The system being analyzed in this case is of the first kind (location-based), one of the most common types. Based on the system’s prediction, the allocation of police resources is defined, especially the presence of police surveillance and control in a determined time–space.

Crime prediction systems are based on criminological theories and studies that assert that crime is not distributed at random, but follows environmental, situational and social patterns than can be

2 Crime prediction or crime forecasting is also known as predictive patrolling or predictive policing. In this report the concept of crime prediction is used most frequently since it is the term commonly mentioned in the context of this case study.

known (Brayne, 2021). To recognize these patterns, methodologies and technologies are used that currently include artificial intelligence techniques. This is a complex process that molds the shape the patterns take based on the specific histories, narratives, materialities and contexts in which they are implemented (Gillespie, 2014). In this case, the crime prediction system analyzed is incorporated into a context characterized by a high perception of urban insecurity and by the reorientation of policing practices toward prevention and surveillance, with a territorial and technical orientation.

This report investigates the context, design, implementation and types of evaluation of the urban crime prediction system installed in 58 townships throughout Chile since 2016. It begins by introducing the local social landscape, going on to analyze the ideas spurring development of this technology, the system design process and its characteristics, with an emphasis on data production and algorithms. It continues with an examination of the ways in which the system is integrated into daily police practices in precincts, closing with an analysis of the ways in which it is evaluated and of the social and ethical consequences of its implementation. The study adopts a situated perspective that observes the mental images, the materialities and the practices associated with the system, using interviews conducted with two lieutenant colonels of the DAC and a CEAMOS engineer; and analysis of legal documents, press and academic articles, and system documentation accessed via an access to public information request.³ The report ends with a reflection on the relationship between the development of technologies and the prevailing idea of security where maintaining order is valued over and above concern and unfettered respect for human rights.

3 Access to Public Information Requests Nos. AD009W0058477 and AD009W0058478.

2. CONTEXT

With the goal of situating the case study, this section introduces contextual elements relevant to understanding the crime prediction system. An overview of the national sociodemographic situation is presented, along with an analysis of the regulatory and institutional framework in relation to security and science, technology and innovation.

Sociodemographic overview

According to the National Statistics Institute (Instituto Nacional de Estadísticas, INE), based on the last Census (2017), more than 19 million people are estimated to live in Chile. While the census population⁴ is three times larger than the census population of the mid-20th century, the growth rate has been decreasing over time and today the country is in an advanced stage of demographic transition. Around 20.1% of the population corresponds to people from 0–14 years of age; 68.5% to 15–64 years of age; and 11.4% are 65 and older. In terms of distribution by sex, 51.1% are women and 48.9% are men.

Throughout the territory known today as Chile, there are nine Indigenous peoples recognized by the State.⁵ Around 12.8% of the census population are considered to belong to an Indigenous population, which corresponds to 2,185,792 people, of whom 49.3% are men and 50.7% are women. The nation with the largest number of people is the Mapuche (79.84%), followed by the Aymara (7.17%) and Diaguita (4.05%) peoples. A constitutional process is currently underway, which includes 17 seats reserved for Indigenous populations out of 155 total seats, and the proposed transformations include the possibility of creating a plurinational state.

Recently, migration has become more relevant in the country due to a significant increase in foreign residents. Around 66.7% of immigrants residing in Chile arrived between 2010 and 2017, with a total census population in 2017 of 746,465 people. This number represents 4.35% of the total population living in the country, compared to 1.27% in 2002. By late 2020 this number had doubled, exceeding 1.4 million people according to INE and Department of Immigration and Foreign Services estimates (2020). The main countries of origin continue the trend of recent years: Venezuela (30.7%), Peru (16.3%), Haiti (12.5%), Colombia (11.4%) and Bolivia (8.5%). In 2021, a decrease of 14,000 foreigners was registered in the migratory flow in the country, according to data from the National Migration Service and the Investigations Police (Policía de Investigaciones, PDI).

Chile's territory is organized into 16 regions. More than half of the population is concentrated in the center-south in the Metropolitan (40.5%) region (where Santiago, the country's capital, is located); Biobio Region (11.6%); and Valparaiso Region (10.3%).

4 The number of people effectively counted in the census is 17,574,003.

5 Mapuche, Aymara, Rapa Nui, Lican Antai, Quechua, Colla, Diaguita, Kawésqar and Yagán or Yamana.

Around 87.8% of the census population lives in urban areas, following the regional trend toward a high rate of urbanization. One data point relevant to this case study is the level of social inequality and urban segregation in the country. Chile is one of the Organization for Economic Cooperation and Development (OECD) members presenting the highest degrees of inequality, with a Gini coefficient over 0.4 points and one of the largest average income gaps between the 10% richest and 10% poorest (OECD, 2018). This situation can affect the presence of social conflict, as affirmed in a study by the Center for Conflict and Social Cohesion Studies (Centro de Estudios de Conflicto y Cohesión Social, COES, 2018). Likewise, its cities are characterized by a historical process of residential segregation marked by the formation of socially homogeneous neighborhoods that divide the population according to socioeconomic features, relegating lower income groups to the periphery or to neighborhoods of precarious habitability (Sabatini, 2003), a process that is compounded in Santiago by the “socio-spatial relocation of poverty” undertaken by the dictatorship. This leads to the stigmatization of certain areas where lives characterized by heavy police presence are built (Han, 2017). This is a critical factor to keep in mind when positioning the case being studied, whose mode of operation is based on urban territorial factors that define patterns of securitization.

The country’s social inequality and urban segregation are linked to the population’s growing feeling of insecurity, which is decoupled from crime trends (Muller y Seligson, 1994; Dammert, 2020, p. 155). Although Chile is one of the countries with the lowest rates of victimization and violence in comparison to the rest of the region, there is a marked feeling of insecurity among the population that is disconnected from the local reality. This is particularly strong in urban contexts. Despite the victimization rate in urban households being relatively low (19.2% in 2020)⁶ and decreasing over time, the perception of insecurity has stayed high: 84.3% of people surveyed claim that delinquency has increased in the country (ENUSC, 2020). However, according to an analysis conducted by the sociologist and political scientist Lucía Dammert (2020) on surveys by the Public Studies Center (Centro de Estudios Públicos, CEP), in the last two decades crime has been the population’s main concern.

Despite the strong feeling of insecurity, the police forces have tended to be among the country’s best rated institutions. This situation persisted even after a series of corruption and malpractice cases in the Carabineros de Chile were uncovered in recent years, several of which were linked to technology:⁷ on the one hand, the misapplication of funds for the purchase of overpriced security technology; on the other, the use of technology to plant false text messages on the phones of known Mapuche leaders as incriminating evidence in a 2017 police operation known as “Operation Hurricane”. The positive appraisal of the police varied depending on socioeconomic level and the relationship that people had to them: those who belong to a lower socioeconomic context and had been in contact with police actions rated them negatively (Dammert, 2016). Following the process of unrest in the country that began in October 2019, assessment of the police fell widely in the context of systematic

6 According to the 2020 National Urban Survey of Citizen Safety (Encuesta Nacional Urbana de Seguridad Ciudadana, ENUSC). It includes households where at least one of the members was the victim of robbery with violence and intimidation, theft without violence or intimidation, burglary with forced entry, petty theft, injuries, vehicle robbery or theft, and robbery and vehicle-based robbery or theft.

7 See Garay and Rogoff (2018).

violations of human rights committed by the state security forces toward protestors (UN, 2019). This has triggered a deeper process of rethinking security ideas, regulations and institutions in the country, particularly in terms of transparency and civilian oversight of police operations.

Security-related regulatory and institutional context

This section presents some key concepts and the regulatory and institutional framework for the case study. First, the concept of security prevailing in the legal system and local practices is reflected on, followed by an analysis of the institutional organization of State security forces, along with questions related to transparency and access to public information.

The concept of security

Security is a central issue for the State—which is characterized by its legitimate monopoly on violence (Weber, 1981)—and permeates the Chilean legal system. However, there is no clear, explicit definition of its meaning, principles and scope. In general, the concept is associated with matters related to maintaining public order and national security, but it can also refer to social security and outline some fundamental rights, ranging from the education and labor spheres, the right to association and the right to strike, to economic activities and property rights (Dammert and Vergara, 2020). Article 1 of the Constitution of 1980, published under the dictatorship, stipulates that it is the State's duty to protect national security and provide protection to the population and the family. Security is enshrined as a right in article 19(7) under the title “right to personal liberty and individual security,” which protects freedom of residence and movement in the territory and respect for due process in terms of the privation of personal liberty, arrest or detention.

Thus, security extends its reach in a range of matters and can be used in different forms depending on the context and on its interpretation. Since the country's return to democracy, the idea of “citizen safety” has become prevalent as a way to distance oneself from expressions used in dictatorial regimes, such as “public security,” “internal security,” and “national security” (Bitar et al., 2014). This trend has emphasized prevention work and multidimensional aspects related to security. However, the punitive perspective continues to have a strong presence, and a warning has sounded regarding an inflation of the value of public order (Gonzalez, 2020) that strains the unencumbered respect for human rights. One of the ways in which the primacy of public order is expressed is the currency of Decree No. 1086 of 1983, which allows the police to block or break up any protest lacking prior authorization from administrative authorities (Gonzalez, 2020). Still missing is a democratic concept of security focused on the protection and promotion of human rights and the development of transparency mechanisms and internal and external oversight of the armed forces and police (Gonzalez, 2020). In the context of Chile's current constitutional process, Dammert and Vergara (2020) emphasize the need to generate a clear definition of security establishing its principles and limits. This is particularly relevant and also entails questioning the institutional organic structure related to this subject, given that in the Constitution of 1980, the security forces were constituted as a fourth branch—joining the

executive, legislative and judicial branches—guaranteeing an institutional autonomy vis-à-vis civilian power that continues, to a lesser degree,⁸ even today (Contreras, 2015; Contreras and Salazar, 2020).

Institutional structure for security

The institutional organization of State security forces is defined in Chapter XI of the Constitution: Armed Forces, On Public Order and Safety; and in Constitutional Organic Laws. The Armed Forces come under the Ministry of National Defense and include the Army, Navy and Air Force. Order and Security Forces come under the Ministry of the Interior and Public Safety, comprising the Investigations Police and the Carabineros de Chile. Both police forces exist to lend efficacy to law and to guarantee public order and internal public security. The Ministry of the Interior is in charge of ensuring the maintenance of public order within the national territory, supervising the operation of police forces and proposing the National Internal Public Safety Policy that defines priorities and guidelines in these matters for each administration. One of its roles is to manage a system of data enabling assessment of the state of internal public security and the efficacy of public policies (Law 20,502). Currently there is a bill signed by President Sebastián Piñera to split the Ministry of the Interior and create an independent Ministry of Public Safety.

The case under study for this investigation focuses on the Carabineros de Chile, one of the institutions with largest presence and deployment throughout the country, with 983 stations and 59,011 officials, of whom 78.5% integrate the order and safety roster (Carabineros de Chile, 2021a). According to Constitutional Organic Law 18,961, the Carabineros is a technical police institution of a military nature whose purpose is to guarantee and maintain public order and internal public security in the whole of the Republic's territory (art. 1).

Since the Carabineros Constitutional Organic Law regulates most of the organization's practices, a problematic autonomy is created that has hamstrung indispensable transformations at the institution (Dammert and Vergara, 2020) due to the high quorums (2/3) needed to amend its regulatory framework (Contreras and Salazar, 2020). There is currently a Carabineros reform process⁹ underway through 2027, which seeks to transform the institution with a focus on the defense and protection of individuals and guided by principles of subordination to civilian authority, transparency, gender focus and human rights. However, this has not materialized clearly in related actions, and the reform is more associated with modernization than with institutional transformation.

8 According to Contreras and Salazar (2020), the constitutional reforms of 1989 and, especially, those of 2005, dismantled the basic architecture of the security branch, thus significantly decreasing the institutional political autonomy of the armed forces. (...) The reforms, however, did not manage to affect the framework of functional operational autonomy that underlies the constitutional text, and which is structured under constitutional organic regulations based on the legal reservation of article 105 of the Constitution (p. 10).

9 Carabineros Reform 2021. <https://reformacarabineros.gob.cl/>

Transparency and access to public information

The Access to Public Information Act establishes the active and passive transparency mechanisms through which citizens can access key information regarding the actions of public agencies. The Transparency Council is the independent body that guarantees access to and disclosure of public information, formulating recommendations to the police and other bodies of State administration to improve the transparency of their activities, facilitating access to their information and applying penalties when the standards are not met.

Although the law establishes the right of every person to request and receive information from any agency of State administration, there are grounds for secrecy or reservation of information. One of these is information whose disclosure to the public could affect national security. This leads to a large percentage of requests for information being rejected by invoking a ground as broad as the maintenance of public order or national defense (Castillo, 2009; Dammert, 2016). This points to lack of transparency as one of the problems with State security agencies.

While the Carabineros have incorporated avenues for strengthening transparency and administrative integrity such as the Department of Public Information and Lobby, the Department of Complaints and Suggestions, and the STOP criminal statistics platform, the majority of data published are not disaggregated, the distribution of police personnel on the ground is secret and there is little information related to misdeeds by the Carabineros. Furthermore, summary investigations within the Carabineros are confidential, which has been questioned by the American Convention on Human Rights and goes against the principle of probity established in the Constitution.

One problem linked to the Transparency Council is that its oversight role, like that of any public agency, is limited to compliance with standards instead of the resolution of problems regarding information requests (ACHR, 2016). This is related, in turn, to the need to recognize access to public information as a fundamental right enshrined in the Constitution (Castillo, 2009; ACHR, 2016).

Another relevant institution in matters of transparency and public monitoring is the Office of the Comptroller of the Republic, an independent agency whose role is to oversee the investment of funds of the different State agencies, including the police. During the accountability review, objections and observations may be formulated, making it possible to monitor the legality of police actions through audits that are a review of activities, results and procedures to verify whether these conform to regulations, principles and procedures. This monitoring is categorized into financial, legal, management, results, account review and evaluation of internal controls. This has facilitated an accounting of the problems associated with the digital platforms used by the Carabineros, through audits that are analyzed in the present investigation.

Regulatory and institutional context in science, technology and innovation

This section presents the normative and organizational environments linked to technology and data relevant to this investigation. The recent reshaping of science and technology institutions is analyzed,

along with the creation of the national artificial intelligence policy. Then, a critical reflection on data regulation and the process of modernization and digitalization of State administration is offered.

Institutional structure: National System for Science, Technology, Knowledge and Innovation

Technological development in our country has been principally promoted by two government sectors, with a fragmentary approach to its implementation. On the one hand, we have the Ministry of Economy, Development and Tourism, in particular the Economic Development Agency (Corporación de Fomento a la Producción, CORFO), created in 1939 to promote industrialization of the country's productive activity and which today seeks to support entrepreneurship, innovation and competitiveness, strengthening human capital and technological capabilities. On the other hand, there is the Ministry of Education through the National Committee for Scientific and Technological Research (Comisión Nacional de Investigación Científica y Tecnológica, CONICYT), created in 1967 and in operation until 2019, whose purpose was the formation of human capital through the Becas Chile scholarship program, and the development of technological and scientific research through the FONDECYT and FONDAP programs.

CONICYT's scientific research development tools include the Program for Associative Research (Programa de Investigación Asociativa, PIA), created in 2009 to promote coordination and relationships among national and international researchers by fostering the creation of scientific and technological groups and centers. One of the research programs financed was ANILLOS for research in science and technology. Under this program the Quantitative Methods in Security (ACT-87) project was awarded to Raul Manasevich as principal investigator, financing the development of theoretical, methodological and technological perspectives that would later be applied in the development of the crime prediction software analyzed in this investigation.

With the publication of Law 21,105 in 2018, this institutional structure undergoes a change. The National System for Science, Technology, Knowledge and Innovation is created; it includes the Ministry of Economy, CORFO and the Ministry of Education, and it also inaugurates a new Ministry of Science, Technology, Knowledge and Innovation, as well as the new National Agency for Research and Development (Agencia Nacional de Investigación y Desarrollo, ANID) that replaces CONICYT. The Ministry is responsible for administering and executing programs and tools oriented to promoting scientific-technological research, development and innovation. In addition, its missions include linking these topics to citizens through the area of public science. This Ministry has been in charge of developing the country's new artificial intelligence policy.

Artificial Intelligence: National policy and international guidelines

In September 2019, the Ministry of Sciences convened an interdisciplinary group of 10 experts to participate in the Committee charged with supporting the base document for developing the National Artificial Intelligence Policy. The Ministry designed a citizen engagement process that consisted of two stages: an open call via the publication of a tentative table of contents where individuals or institutions could provide input, to which nearly 1,300 people responded; and the conduct of 15

webinars, which addressed AI from different vantage points. This input was analyzed, and objectives and strategies were created for the policy's development.

The final document, published in October 2021, contains the strategic guidelines that the country must follow to promote the use and development of AI tools and to debate AI's ethical, legal, social and economic consequences. It includes around 70 priority actions and 180 initiatives to be developed between 2021 and 2030. Despite the participatory process, it remains unclear how the input was incorporated, and there are some key issues that the document leaves out, such as the environmental impact of this kind of system in the context of the climate crisis, as well as the need to locate human rights as a central axis in the development of these technologies.

The local context surrounding the policy's development is also in dialog with the international organizations in which the country participates and their discussions around AI. One is the OECD (2019b), which has established key guidelines on the subject. Among its principles, the following stand out: inclusive growth; sustainable development and human wellbeing; designing AI systems that respect laws and democratic values; transparency and responsible disclosure of AI systems; safety and protection of the systems; and responsibility of the organizations and individuals that develop, implement and operate AI systems. Another of the international ethical standards recognized by Chile in the area of AI is Ethically Aligned Design, which proposes advances in the public debate on how to establish ethical practices for autonomous systems, aligning itself with principles and values that give priority to human wellbeing (IEEE, 2019).

It is pertinent to keep these normative guidelines in mind when conducting an analysis of the incorporation of artificial intelligence systems in security-related areas, as is the case with this study.

Data regulation

The main way that data are currently protected has to do with one kind of data: personal data. Law 19,628 on Protecting Privacy regulates the handling of data of a personal nature, by public or private agencies, in registries or databases. Personal data is defined as any information of a personal nature concerning natural persons, identified or identifiable; and sensitive data that refer to physical or moral characteristics of individuals or to events or circumstances of their private life or privacy, such as personal habits, racial origin, political ideologies and opinions, religious beliefs or convictions, physical or psychological states of health and sexual life (Law 19,628). The mishandling of personal data by a legal person, private individual or public agency is penalized under the law with compensation for patrimonial and moral damages, as well as eliminating, modifying or blocking the data.

Some of the criticism of Law 19,628 refers to how the principles are handled haphazardly and in a confusing manner; that it is not adapted to the rapid, massive flow of information prevalent today; that data subjects have no guarantees regarding the use of their information; that there is no obligation for express, prior and unequivocal consent by the data subject for handling their sensitive data; etc. (Matus, 2013; Viollier, 2017; Valderrama, 2021). In addition, in case of the mishandling of personal data, a summary procedure is conducted that entails a cost for the affected person, which is

inappropriate considering that the punitive action should be guided by an administrative authority vested with that power.

Law 19,628 has been subject to attempted amendment on various occasions,¹⁰ and there is currently a reform bill pending.¹¹ This intends to align the law's precepts with international standards and guidelines on the subject, such as the European Regulation on Data Protection. Its content includes the creation of the Personal Data Protection Agency that would hold oversight and punitive powers. However, a differentiated sanctioning regime would exist for those liable: if they are public agencies, they would be penalized by the Office of the Comptroller of the Republic, and the Agency would only define the infraction; whereas if they are private agencies, they would be punished by the Data Protection Agency. This difference has no justification and could open the door to a series of abuses by authority.

In June 2018, Law 21,096 was published, constitutionally enshrining the Right to Data Protection, amending article 19(4) of the Constitution to include within the fundamental right to respect and protection of privacy and the honor of the person and his or her family, the right to protection of his or her personal data.

As regards personal data at security institutions, uses must comply with the regulations in force, and the institutions may neither turn over to a foreign state or international organization nor give them access to national databases. In terms of projects in this area, the creation of the Single Database (Banco Unificado de Datos, BUD) is noteworthy; this was announced in 2012 but, following a series of controversies and poor implementations, has only been operational since 2019 via Decree 899. The BUD functions using two computer systems for exchanging data on accused and convicted persons between the Public Ministry, Carabineros, the PDI, gendarmerie and the judicial branch, pursuant to Law 19,628. Its purpose is to support investigative work in the penal process.

One police platform with a heavy flow of personal data is the Carabineros Virtual Police Station. Developed to process police paperwork (in particular, obtaining movement permits or safe conduct passes in the context of the COVID-19 pandemic quarantine), the platform had an average of 626,514 daily visits during 2020 (Carabineros de Chile, 2020a). Despite its importance, an audit conducted by the Transparency Council from April to July 2020 confirmed the massive handover of databases containing personal information on the platform's users. It also identified that as of July 2020, the Carabineros had not publicly defined a privacy policy for the data to inform of the way that these would be handled and stored. This case reveals the fragility of data in local public systems, especially in a context of accelerated digitalization.

10 Attempts at amendment include Bulletin 6,120-07; the Introducing Amendments to Law 19,628 and Law 20,285 bill, entered on October 1, 2008; and Bulletin 8,143-03, a bill introducing amendments to Law 19,628 on Protecting Privacy and protecting data of a personal nature, entered on January 11, 2012, which seeks to replace the text nearly in its entirety.

11 Bulletin 11144-07, whose processing began in March 2017 and is currently in its first constitutional processing stage in the Senate.

Digital transformation of the State

Through Law 21,180, published in November 2019, a modernization and digitalization process for government administration has been promoted. This means that all procedures must be documented using digital media, with some legal exceptions. To this end, certain general principles have been established, such as the updating of technological platforms; the principle of interoperability (which indicates that electronic media within government administration must interact with and be operable between one another); and the principle of cooperation between State agencies in the use of electronic media. These are required in addition to meeting cybersecurity standards.

The main criticism of the new law includes the circumstance that not all State agencies have the technical, economic or political resources to comply with the ordered updating. To be implemented effectively, the law or a regulation could order making an external expert in the subject responsible for the construction of computer platforms that enable the correct implementation of digitalizing the processes. From a technical perspective, the capacity of the government's networks to support the data flow is questionable. Another problem is the population's access to services, keeping in mind that in Chile nearly a fifth of the population still lacks Internet access, despite the country having made significant progress in overcoming the digital gap (CAF, 2020). Furthermore, the unique identifier is the pillar of the digital transformation of the State strategy, which is open to criticism due to the fact that it is very easy to find a person's data using the National ID number (Rol Único Nacional, RUN), because there is no mechanism to confirm that the person accessing the unique identifier platform is in fact the number's owner (CAF, 2020).

3. CASE DESCRIPTION

This section presents a socio-technical analysis of the urban crime prediction system. It begins by exploring the motivations, ideas and theories that influence the system's construction. It continues with a study of the technologies developed, in particular the data and algorithms that constitute the system's infrastructure. Finally, the system's implementation in precincts is presented.

Prevention, prediction and surveillance in the city

Perceptions of insecurity, prevention and prediction

As mentioned previously, one of the characteristics of the Chilean urban context is the marked feeling of insecurity among city dwellers. This situation is one of the factors spurring creation of the crime prediction system. According to the software's developers, their motivation stems from "a high worry of the Chilean population with urban crime" (Baloian et al., 2017, p. 2). In the Carabineros' strategy, reducing the feeling of insecurity goes hand in hand with prevention, which is proposed in the project's objectives, as presented in the Technical Report for the system's procurement¹² (DNOS and DAC, n/d). What is sought is to develop

"an urban crime prediction system based on mathematical algorithms that enable targeted patrolling of an anticipatory nature, with the goal of strengthening the Carabineros' preventive work and the efficacy of the law enforcement system" (p. 5).

To achieve this, the system had to develop a spatio-temporal precision to identify risks of crimes in the city through processing the Carabineros' database, generating sufficiently focused, "significant predictions" (Baloian et al., 2017, p. 3). This in turn would enable an effective and efficient allocation of police resources, particularly the preventive patrolling of police officers in the field, since current actions

"are based on studies of criminal activities that have already happened; however, it becomes necessary to have the ability to conduct proactive actions (...) using early warnings of high-risk events, with enough time to formulate an effective action plan" (DNOS and DAC, n/d, p. 4).

The implementation of this model seeks to transform the way in which policing actions are planned, in the context of a preventive approach and the modernization of the institution's technological tools in sync with market developments (DNOS and DAC, n/d).

¹² The project's technical bases included the development of a rural crime predictor "to address the problem of reducing the porousness of the country's border, helping to plan the place and time at which limited border monitoring resources could be used effectively" (Carabineros de Chile Public Procurement Office, n/d, p. 3). This project was developed in parallel and is independent of the urban predictor; it is not analyzed in this investigation.

To expand on the system's development, it must be situated among the Carabineros policies and strategies that have defined both how policing practice is conceived of and operationalized and, consequently, its technological implementations. In the mid-1990s, the Carabineros started to position crime prevention as one of their central objectives, developing strategies linked to surveillance and control of the population to avoid the commission of crimes. The main operating strategy they used for this is the Quadrant Plan for Preventive Security (Plan Cuadrante de Seguridad Preventiva; henceforth, Quadrant Plan) which seeks to contribute to reducing victimization and fear by raising the levels of perception of security, using a preventive policing strategy,¹³ through a surveillance by quadrants¹⁴ system with notably closer community relations (Carabineros de Chile, 2018, p. 8). This strategy began in 1998 in the Santiago Sur prefecture and was later extended to 44 townships. In 2004, the first National Citizen Safety Plan was officially incorporated. In 2013, under the Safe Chile Plan (Plan Chile Seguro, 2010–2014), the strategy covered 150 townships around the country, reaching around 88% of the urban population (Carabineros de Chile, 2018). This plan mentions the implementation of predictive mapping defined as a predictive spatial model enabling proactive work in the urban micro-space (Ministry of the Interior and Public Safety, 2014, p. 62). Throughout the plans, the focus was on organizational learning and in the development of methodologies and techniques to achieve scientific–technical knowledge to face great changes in ways of policing, elaborating on definitions for establishing real human resource, logistical and technological needs (Carabineros de Chile, 2018, p. 1).

One of the basic characteristics of this strategy is the police force's territorial (municipal and police station levels) and technical approach, strengthening criminal analysis at precincts through the Operations Office (OO) and on-the-ground presence using preventive surveillance and closer community relations. In 2018, the Quadrant Plan was updated to version 2.0, including among its initiatives the implementation of computer systems capable of automating operational and support functions that take place at different levels of the institution (Carabineros de Chile, n/d). Data collection and analysis become central to police work, since the information enables an analysis of the crimes, which turns into targeted policing services and specific preventive tasks to be developed (Carabineros de Chile, 2018, p. 84), mainly police surveillance and control.

Within the institution, police surveillance is understood to mean actions tending to prevent the generation of undesirable situations or to detect these for their neutralization (Ministry of Social Development, 2013, p. 10), which translates into the following operational tasks: preventive surveillance, police procedures, selective oversight, extraordinary services and executing warrants

13 Under this strategy, prevention is thought of according to the United Nations Commission on Crime Prevention and Criminal Justice (Vienna, May 1999), and consists of the application of all measures that are defined and implemented to attack the opportunities that facilitate or enable the commission of those crimes (Carabineros de Chile, 2017a, p. 104). Some of its characteristics are as follows: it seeks to anticipate the commission of the crime; it requires an assessment that describes reality, selects courses of action to be implemented and neutralizes enabling or generating factors (Carabineros de Chile, 2017a, p. 104).

14 Quadrant is understood to be a subsector of responsibility of a variable nature, parametrized according to pre-established criteria, where preventive and operative police surveillance actions are executed (Carabineros de Chile, 2017a, p. 44).

(Ministry of Social Development, 2013, p. 10). More recently, the new “Centenary Carabinero” 2021–2018 Policing Development Strategy Plan, mentions evidence-based surveillance to refer to the development of information analysis methods to develop predictive crime models, which make it possible to place a surveillance measure at the correct place and time, through the use of technologies, such as for example big data analysis (Carabineros de Chile, 2021b, p. 19). The document emphasizes the contribution of predictive models from the Crime Analysis Department that are incorporated into the Carabineros’ daily operations through diverse information systems and crime analysis practices at each precinct.

Crime analysis and development of crime predictors

In late 2011, the Crime Analysis Department was created as a technical body at the Carabineros whose role is to validate the information that the institution provides to other entities on its digital platforms, which are connected to all precincts in the country. Its primary objective is to establish crime patterns by integrating crime analysis at the institution. It comprises 18 Carabineros officials, including geography and engineering professionals, and its work is supported by 40 civilian professionals. It is divided into four sections: statistics, territorial information, operational support and training, and criminological analysis (Carabineros de Chile, 2021c).

The DAC arises from the Carabineros Center for Strategic and Criminological Studies, founded in 1995. This center was the institutional space that headed development of the first crime predictor project, known as “Predictive crime model for the Metropolitan Region,” from 2004 to 2007, co-financed by private funds and a public fund¹⁵ awarded to the Carabineros Academy of Police Sciences (Academia de Ciencias Policiales, ACIPOL), and constructed by academicians from the Universidad de Chile. The project’s main objective was to develop a computer instrument designed to provide relevant information to support decision-making in the spatial/temporal allocation of police resources at the precinct level (González, 2008, p. 7) through the implementation of an information system using the Carabineros digital database (AUPOL) and the design and implementation of a prediction system for geographic areas with the highest concentration of reports, based on data mining tools and neuronal networks (González, 2008, p. 7). The main result was the creation of the OMINIS police prediction software package that makes it possible to forecast the probability of occurrence of criminal activity in certain geographic locations, which optimizes strategic planning and the allocation of institutional resources (González, 2008, p. 21). A pilot was developed in a Santiago precinct which was then scaled up to five precincts,¹⁶ training Carabineros officials in its use. However, the project did not deliver the expected results, due to the volume of information that had to be processed and mapped (DNOS and DAC, n/d, p. 4), a task that could not be done due to the technological capabilities of the time. According to the Carabineros, this project marked one of the first connections between the institution and the academic research and development (R&D) world.

15 Fund for the Promotion of Scientific and Technological Development (Fondo de Fomento al Desarrollo Científico y Tecnológico, FONDEF) D0311025.

16 1st, 7th, 16th, 19th and 47th Santiago Precincts.

As a product of this process, 2007 saw the emergence of CEAMOS, an entity associated with the Mathematical Modeling Center and the Complex Engineering Systems Institute of the Universidad de Chile. CEAMOS goes deeper into computational criminological research and develops the crime prediction model that would finally be implemented in 58 townships¹⁷ throughout the country, of which 37 are in the Metropolitan Region and 21 are in regional capitals.¹⁸ The goal of CEAMOS is to develop quantitative and analytical models for improving the prevention, prediction and understanding of criminal behavior, working through multidisciplinary activities that combine criminology, computational modeling, geographic information systems, mathematical modeling, economics, game theory, and statistics, among others (CEAMOS, n/d). In 2009, 450 million Chilean pesos from an ANILLOS science and technology fund from CONICYT is awarded to develop a “Quantitative methods in security” research project, from 2010 to 2013, directed by the doctor in engineering Raúl Manasevich. Main activities are divided into three areas: 1) research and training of students and young researchers, 2) obtaining and consolidating the national and international presence of CEAMOS (...) and 3) the study and solution of applied problems in security that require advanced quantitative methods (Manasevich, 2013, p. 7).

There are two important issues to highlight from this initiative that have direct influence on the development of crime predictors. On the one hand, the international and local network forged over these years,¹⁹ featuring participation from notable researchers in the field of computational criminology from the United States and Canada—such as Patricia and Paul Brantingham, Marcus Felson, and Andrea Bertozzi, George Mohler and Jeff Brantingham, where the last three are creators of PredPol, one of the first predictive policing software packages implemented in 2006 in the Los Angeles Police Department. At these events, research escapes academia and includes participants who are responsible for public policymaking, such as the ex-Mayor of Santiago Carolina Tohá, the ex-Undersecretary of the Carabineros Javiera Blanco, ex-Minister Sergio Bitar, and members of the Carabineros. This made it possible to position theoretical and practical perspectives on security in the public policy sphere which, in the case of Chile, goes hand in hand with development of the Quadrant Plan and the National Citizen Safety Plan. This process of meetings is essential for installing and deepening certain criminological theories and computational methodologies at the Carabineros.

17 Arica, Iquique, Antofagasta, Calama, Copiapó, La Serena, Coquimbo, Valparaíso, Viña del Mar, San Antonio, Rancagua, Talca, Curicó, Concepción, Talcahuano, Los Ángeles, Chillán, Temuco, Valdivia, Puerto Montt, Coyhaique, Santiago, Cerrillos, Cerro Navia, Conchalí, El Bosque, Estación Central, Colina, Independencia, La Cisterna, La Florida, La Granja, La Pintana, La Reina, Las Condes, Lo Barnechea, Lo Espejo, Lo Prado, Quilicura, Maipú, Huechuraba, Pedro Aguirre Cerda, Ñuñoa, Providencia, Pudahuel, Macul, Quinta Normal, Peñalolén, Renca, San Joaquín, San Miguel, San Ramón, Vitacura, Puente Alto, Recoleta, San Bernardo, Melipilla and Talagante (Request for Public Information AD009W0058477, 2021).

18 With the exception of Punta Arenas, whose low crime rate prevented reaching the minimum quantity of data needed to apply the predictive model.

19 The members of the initiative organized three international meetings in Chile (WAMOS - Security Analysis and Modeling Workshop [Taller de Análisis y Modelamiento de la Seguridad]) between 2011 and 2013, and two meetings in Canada (jointly with the Pacific Institute for Mathematical Sciences [PIMS] and the Institute for Canadian Urban Research [ICURS]) and the United Kingdom (jointly with the Jill Dando Institute at University College of London [UCL]).

The criminological theories installed are based on perspectives developed since the late 1960s that emphasize situational risks to understand and control crime. This approach to crime has been called “daily life criminology” by David Garland (1996): a collection of theories²⁰ in which “crime becomes a risk to be calculated (both by the offender and by the potential victim) or an accident to be avoided (Poyner, 1986), rather than a moral aberration which needs to be specially explained” (p. 451). The focus was thus on understanding the environmental characteristics that would enable a crime to occur and the possibility of modifying them using spatial transformation (e.g., incorporating more streetlights) or police presence. One of the shapes that these theories take is that of the Crime Triangle, representing the idea that a crime happens only when a victim and a criminal meet in a given time-space, in the absence of a guard or other actor or element that could keep the opportunity from materializing. In combination, these schemes promote widespread daily surveillance and an intensive police presence on the ground in calculated critical areas. These theories have been proposed in the approaches to policing strategies developed at the Carabineros in recent years.

Currently, criminological theories are accompanied by the development of mathematical and computational strategies to define high-risk zones for intervention. Under the CEAMOS initiative, an agreement is signed with the Carabineros to implement a joint program in Quantitative Methods in Security with ACIPOL in 2011, developing courses that apply engineering to develop crime models (Manasevich, 2013). In addition, a project is started that seeks to predict crime outbreaks in the city (Manasevich, 2013, p. 9).

In parallel with the development of the CEAMOS projects, the DAC was analyzing different crime prediction software packages for incorporation at the institution. One of them was the software from the US company CCR Data to Knowledge, tested in some sectors of the La Florida township during 2013 (DNOS and DAC, n/d). One of the problematic issues with the CCR work was the sharing of data outside the country.

The idea also arose of installing the PredPol software. The chief of the Studies and Programs Division of the Undersecretary for Crime Prevention (2014–2018) traveled to Uruguay to see the recent implementation of the system spearheaded by that country’s Ministry of the Interior.²¹ The problem is that PredPol was very costly²² and, considering the experience of local engineers, the Undersecretary and the DAC decided to set up a joint collaboration agreement with CEAMOS to develop the system. The Undersecretary financed the project²³ for the software to be developed from 2015 to 2016.

20 Routine activities theory by Marcus Felson and Ronald Clarke, broken windows theory by George L. Kelling and James Q. Wilson, situational crime prevention theory, crime pattern theory, rational action theory and crime opportunity theory.

21 According to a UNDP report (2020), the PredPol software “was used by the MIU [Uruguayan Ministry of the Interior] from 2014 to 2017. This information was the basis for deploying dissuasive patrolling resources. However, based on an evaluation, the MIU decided to discontinue the use of PredPol” (UNDP, 2020, p. 110).

22 Its implementation was calculated at US\$ 10,833,333.

23 The project had a cost of \$168,820,000 Chilean pesos.

Infrastructure and implementation of the urban crime prediction system

In the previous section some of the ideas spurring development of this technology were presented. In this section the social construction of the data and algorithms comprising the system's infrastructure are analyzed, questioning the narrative associated with them—of a purely technical response to problems of efficiency—to understand their implications in the configuration of daily security practices in the city, especially their potential consequences in terms of inequality, exclusion, liability and transparency. This is relevant since this kind of infrastructure carries a silent power. On the one hand, once installed, its operations tend to remain out of sight despite participating in daily actions. On the other, its aura of objectivity and the opacity of its operations positions it as a “black box” that can tend to decrease the level of police accountability and complicate civilian monitoring (Brayne, 2021). It thus becomes critical to open these “black boxes” up to public scrutiny.

The system's infrastructure is composed of two essential elements: databases and algorithmic models. The construction of each of these elements not only involves technical and material processes but is also defined based on the social practices with which they are intertwined. Accordingly, when we talk about infrastructure, we are referring to the socio-technical processes that facilitate the development, implementation, maintenance and daily operation of technological systems; as well as the narratives, history and actions that take shape through them (Parks and Starosielski, 2015). Thus, the datasets and models used in artificial intelligence systems “are not objective representations of reality. They are the culmination of particular tools, people and power structures that foreground one way of seeing or judging over another” (boyd and Elish in Benjamin, 2019, p. 34). It becomes necessary, then, to delve into all these aspects to successfully grasp the system in all its complexity.

Infrastructure often functions on top of other, existing infrastructure. In this case, the prediction system operates over the Carabineros information systems associated with Quadrant Plan operations²⁴ at the precinct level. In particular, the system works based on two police platforms: AUPOL and SAIT. Each corresponds to an aspect of the system infrastructure that we will address below: the first to data and the second to the algorithmic models that construct the dynamic risks maps which are the final outcome of the process.

24 The Carabineros information systems include other platforms that are not analyzed in this report, due to the fact that they are not directly related to the crime prediction system. See Annex 1 for more information.

Table 1: Carabineros Quadrant Plan Information Systems used in the urban crime prediction system

Source: Author's work based on Carabineros de Chile documentation.

System Name	Description
AUPOL (Automatización de Unidades Policiales) [Police Unit Automation]	<p>AUPOL is the Carabineros' main platform for recording and storing data referring to complaints, arrests, records and violations. This system facilitates the generation of police reports that are provided to courts and public prosecutors.</p> <p>It includes the following platforms:</p> <p>AUPOL Data Transfer System: A platform making it possible to download the list of all the crimes and their variables that are entered during on-call duty, such that these data can be analyzed using programs like Excel (Carabineros de Chile, 2017a, p. 137).</p> <p>AUPOL Management Control System: A platform that makes it possible to display the police reports that are entered on duty to read them and retrieve non-parameterized qualitative information, such as modus operandi (Carabineros de Chile, 2017a, p. 142).</p> <p>In the AUPOL DIGITAL version of the program (operational in 63 precincts of the Metropolitan Region as of 2017), the information is available for access by the Prosecution Authority (Ministerio Público) via its Public Prosecutor Support System (Sistema de Apoyo a los Fiscales, SAF) (Office of the Comptroller, 2019).</p> <p>In 2017, AUPOL 2.0 was under development by the GTD INTESIS S.A. company.</p>
SAIT (Sistema de Análisis de Información Territorial) [Territorial Information Analysis System]	<p>SAIT is a platform that geolocates information from police cases (arrests and complaints) to focus and streamline available resources for better decision-making (Carabineros de Chile, 2017a, n/p) at the precinct. It makes it possible to display on a map the location and concentration of criminal events in different timeframes. It is possible to select by type of crime to define areas of high criminal involvement (Carabineros de Chile, 2018, p. 185).</p> <p>On this platform, the crime hotspots are processed and incorporated into the crime prediction system to generate dynamic risk maps.</p>

Using data sharing, AUPOL supports the operation of SAIT, the platform that displays the information in a georeferenced manner and makes it possible to operationalize use of the data in daily police decision-making in each precinct.

Databases: Police practice as the practice of data production

“Where there is a good, georeferenced database, we can make a prediction,” states Raúl Manasevich (2020), main engineer for the crime prediction system, highlighting the central importance of data for developing algorithmic models. As a result, the data production process—from collection and classification to storage—defines the results obtained by the system, by defining the universe being observed and through which patterns for areas at highest risk of crime are built. In this sense, creating a database is an “exercise in worldbuilding,” a normative process in which programmers are in a position to project their world views” (Benjamin, 2019, p. 187). What data measure and quantify is

not just a technical question; it is “related to institutional priorities, organizational imperatives and individual and group preferences” (Brayne, 2021, p. 29).

The crime prediction system uses two kinds of data. The first kind come from police cases, which include arrests and complaints related to crimes of major social significance (CMSS) grouped in Robbery with Force and Robbery with Violence. The cases are registered by police officers on the AUPOL platform, including data on the official entering the complaint or arrest in the system, and personal identification data for the victims, witnesses, complainants and/or detainees with full name, ID number [RUN], profession, education level, sex, age, physical characteristics, height and residential address (See Annexes 2 and 3). However, these personal data are not used by the prediction system, which only includes information on the temporal (day and time) and geographic coordinates of the police cases, considering data from police cases up to 5 years old. The processing and storage of these data is done on Carabineros servers administered by DAC computer engineers, who are responsible for security, process review and storage management (Pizarro, 2021).

The second kind of data considered cover the location of urban amenities and attractions identified as relevant context factors that could cause or facilitate the commission of a crime. Based on an analysis of co-occurrence of amenities and crime, the developers estimated that the most significant are banks, bus stops, restaurants and automatic teller machines (ATMs) (Baloian et al., 2017, p. 4). These data are obtained through information recorded by police officers in the Carabineros geographic information system and from crowdsourced platforms like Open Street Maps (Baloian et al., 2017; Carabineros de Chile, 2018).

The use of this kind of data is related not only to its availability but also to criminalistic environmental theories that inform the Carabineros’ activity and the development of these systems, as seen in the previous section. In addition, something peculiar that can be noted in the choice of using CMSS data is that it is a type of crime that has a high impact on the perception of urban insecurity according to what was posited by the Carabineros and engineers, which goes hand in hand with the system’s objective seeking to reduce not only the crime rate but also the feeling of insecurity in the city.

Table 2: Data used in the Urban Crime Prediction System

Source: Author's work based on Baloian et al. (2017), Carabineros manuals, public information request and interviews.

Type of data	Description	Database origin
Crimes of major social significance (CMSS) grouped into Robbery with Force and Robbery with Violence.	<p>The data used by the system correspond to the geographic and temporal location of police cases corresponding to CMSS-related complaints and arrests entered into the AUPOL system, for the following groups of crime:</p> <p>a) Robbery with Force group of crimes:</p> <ul style="list-style-type: none"> - Theft of vehicle accessories or cash from inside vehicles - Taking electrical or communications cables - Robbery at inhabited place or intended for habitation - Robbery at an uninhabited place - Theft of a motor vehicle - Theft of State property designated for public use - Robbery with Force of items - Theft of vehicle using distractive elements - Robbery with Force at ATMs <p>b) Robbery with Violence group of crimes:</p> <ul style="list-style-type: none"> - Robbery with restraint of victims - Robbery with serious or gross injury - Robbery without violence or intimidation - Robbery with violence - Robbery with rape - Robbery with restraint of victims or with serious injury - Robbery with intimidation - Robbery with homicide - Robbery with castration, mutilation or serious or gross injury (Pizarro, 2021) 	AUPOL - Carabineros de Chile
Urban context factors (urban amenities or attractions)	Location of urban amenities and attractions identified as relevant context factors for causing or facilitating the occurrence of a crime. According to the system's developers, the location of banks, bus stops, restaurants and ATMs is considered.	Carabineros de Chile, Open Street Maps and other unspecified crowdsourced geographic platforms.

The main database feeding the system is AUPOL. This platform contains one of the biggest crime data repositories in the country²⁵ and is one of the central information systems for all Carabineros operations, as it contains the database of criminal activity feeding the rest of the systems and covers institutional management, territorial and statistical analysis platforms, and the police reports that are provided to the Prosecution Authority (Carabineros de Chile, 2021b). It was created in 1992 to incorporate computational resources as a tool supporting the operational and administrative responsibilities implemented by police units (MIDEPLAN, 1996, p. 2). In 2005, its installation was finalized in nearly all operational units in the country (937 units) (Transparency Council, 2014). It currently operates over a series of related platforms on which information is registered, shared, downloaded or displayed.²⁶ AUPOL facilitates the existence of a large volume of digitalized crime data, which in turn led police officers in the DAC to think of big data's²⁷ potential for predictive analytics use, and led CEAMOS to qualify this database as being of high quality (Baloian et al., 2017) for developing this kind of system due to the availability of georeferenced data.

As can be seen, AUPOL is a central platform in policing practice, accounting for the central role of data collection and registration at the Carabineros. In this sense, it could be said that policing practice also operates as a data production practice (Richardson, Schultz & Crawford, 2019). Despite this activity's importance, little is known of how the police force builds and uses the data in practice. In this case, the engineers who developed the predictive system did not assess the quality of data production in relation to the context and process of collection, and the problems associated with the kind of data used, such as arrests and complaints. For them, this is a Carabineros problem unrelated to the solution they are developing; they are limited to receiving the database, "cleaning up" the information and reorganizing it so it can work in their algorithmic models. However, in the context of policing practice there is a high probability of producing "dirty data" (Richardson, Schultz & Crawford, 2019).

The term "dirty data" refers not only to data that can be missing or mistaken, but also to the culture of data production in the policing context, data that may derive from or be influenced by "corrupt, biased and unlawful practices, including data that have been intentionally manipulated or 'juke'd,' as well as data that [are] distorted by individual and societal biases" (Richardson, Schultz & Crawford, 2019, p. 18). In this case, the policing context has not been spared the conflicts and controversies associated with the protection or elimination of key information of various kinds, as was seen in the Camilo Catrillanca murder case in 2018 and, more recently, in the preservation of police bodycam videos in the context of the protests that began in October 2019 in Chile (Cifuentes and Fox, 2021).

25 In 2014, in one month approximately 120,000 complaints, 35,000 arrests, 130,000 records, 90,000 violations, 900,000 preventive checks, 200,000 alcohol verifications and 120,000 warrants, adding up to 1,595,000 records were registered (Transparency Council, 2014, p. 4).

26 AUPOL management control system, AUPOL data transfer system, AUPOL Digital.

27 Big data is a term that generally refers to the "3 V": Volume (large quantities of data), Velocity (processing speed) and Variety (combination of different sources or types of data). It thus refers to the processing of large quantities of data by computer systems that find patterns difficult for a person to identify (Brayne, 2021). According to one of the engineers interviewed, the database does not have the volume of data necessary to be categorized as big data. However, it is treated as such, and at the Carabineros, talk is of a database with big data characteristics.

More specific to this system, the use of complaint and arrest data entails problems associated with irregular procedures such as wrongful or arbitrary arrests, or those that do not follow due process.

Another source of dirty data from the system is the so-called “dark figure” of unreported crime or criminal events that are, therefore, not contained in the AUPOL database. According to ENUSC (2017), 61.5% of crimes are not reported. This means that the complaints entered into AUPOL correspond to around 38.5% of crimes. This situation is recognized by the Carabineros as a serious problem to take into account when understanding the results of the computer tools that the operations office uses to conduct its analyses (Carabineros de Chile, 2018, p. 181), along with the importance of keeping in mind other sources of information to strengthen crime analyses, such as data collected by the Community Integration Office. While the “dark figure” for crime is a problematic issue for the Carabineros, it was not taken into account when the engineers assessed the quality of the dataset.

Another source that produces “dirty data” are the practices associated with AUPOL operations. In 2019, the Office of the Comptroller conducted an audit of the AUPOL DIGITAL system database, documenting a series of problems. On the one hand, regarding the integrity of data entered for each police case, there was a series of risks that it would be affected due to the following: a) the date, time and description of events fields are not obligatory and can be skipped (p. 3); b) there is no dictionary of data with precise, rigorous definitions that can clearly systematize the information, thus avoiding misunderstandings;²⁸ and c) the system under analysis lacks technical documentation, e.g., use cases, process diagrams, class diagrams, etc. that offer knowledge for its maintenance. The foregoing means that the institution is highly dependent on the knowledge captured by the programmer in charge of the system, fostering that this official be indispensable and irremovable from his or her role (Office of the Comptroller, 2019, p. 12). On the other hand, in matters of security, it warned of the lack of an information security policy and the absence of an information security commission (p. 23), which is related to a series of potential bad practices that were not evaluated.²⁹

All of the above calls into question the results obtained in the algorithmic models presented below. We will return to these points in the following sections, in particular in the section on critical evaluation of the system.

28 This situation contravenes the content of point 43 of Exempt Resolution 1,485 of 1996, of this origin, which indicates that internal control structures and all transactions and significant acts must be clearly documented, and the information must be available for its verification (Office of the Comptroller, 2019, p. 11).

29 The malpractice includes: a) the inexistence of an information security manager; b) weaknesses regarding information preservation (p. 3) when there is no policy on the use and administration of the systems and on the secure use of institutional e-mail (p. 3), which is connected to the lack of procedures for the authorization, registration, amendment, revocation and periodic review of user access permits and the inexistence of a procedure on changing passwords for system administration accounts for database management; and c) a lack of formalization of the protocol for entering server rooms. (Office of the Comptroller, 2019, p. 23).

Algorithmic mapping: Building red zones on dynamic risk surfaces

In 18 months³⁰ and based on the data available, the CEAMOS team developed an algorithmic system³¹ combining three independent modular systems to identify patterns that would enable the construction of risk surfaces,³² i.e., maps that identify red zones indicating a greater risk of a crime occurring in a defined time and space (Baloian et al., 2017, p. 8).

The algorithmic models developed are based on the observation that the frequency of crimes is unevenly distributed over time and space, which would provide clues that there may be patterns to the occurrence of crimes and, therefore, it would be possible to develop predictive models (Baloian et al., 2017). This assumption was already included in the Carabineros' crime analysis, which has incorporated crime hotspot analysis since 2010.³³ Hotspots are instruments that georeference crimes that happened in a determined timeframe and display the areas where there is higher concentration or distribution density of them, organized by type of crime and quarter of the year. This methodology is incorporated into the SAIT platform, the web display mapping police cases that the AUPOL database geolocates. In 2016, SAIT was updated to version 2.0, into which the crime predictor would later be integrated.

The difference between crime hotspot analysis and the current prediction system is mainly found in its temporality. In addition to being more accurate because it works at a more limited territorial scale and constantly updates the information, it is not only displaying past data (what happened), but also projecting this past onto a possible future by analyzing the data through data mining or predictive analytics methods to reveal new criminal patterns (Baloian et al., 2017). Furthermore, this analysis incorporates assumptions on the dynamics of criminal activity such as context factors considered relevant. Both the hotspot analysis and the crime predictor are currently used in precincts, defining red zones that do not necessarily coincide (see Figure 10). In the case of townships in which the predictor is not incorporated, the hotspot analysis is the one taken into account when defining patrolling areas. In addition, hotspots for preventive checks conducted by police officers are built, which are then compared to crime hotspots to see their effectiveness and variation.

30 Eighteen months was the timeframe stipulated in the Technical Bases. However, in the publication by Baloian et al. (2017) they mention 15 months.

31 Although the model was developed by CEAMOS, both the system's source code and its intellectual property belong to Carabineros de Chile, as per Contract No. 147/2015 signed on 15/SEP/2015 (Pizarro, 2021).

32 Due to their size and weight, the risk surfaces are stored for a period of one year and periodically eliminated (Pizarro, 2021).

33 Hotspot analysis is incorporated via SAIT in the 2010 Quadrant Plan for Preventive Public Safety Operating Manual. However, it could have been used prior to this date.



Figure 1: SAIT platform showing the display of hotspots in Santiago (left) and Rancagua (right) (Bassaletti, 2013). The left-hand image shows that the highest concentration of hotspots in Santiago is located in the south and northwest zones, corresponding to sectors of lower socioeconomic levels. In the image on the right, the police case hotspots are compared to hotspots for preventive checks conducted by carabineros for the first quarter of 2013 grouped by Robbery with Force in a zone of Rancagua.

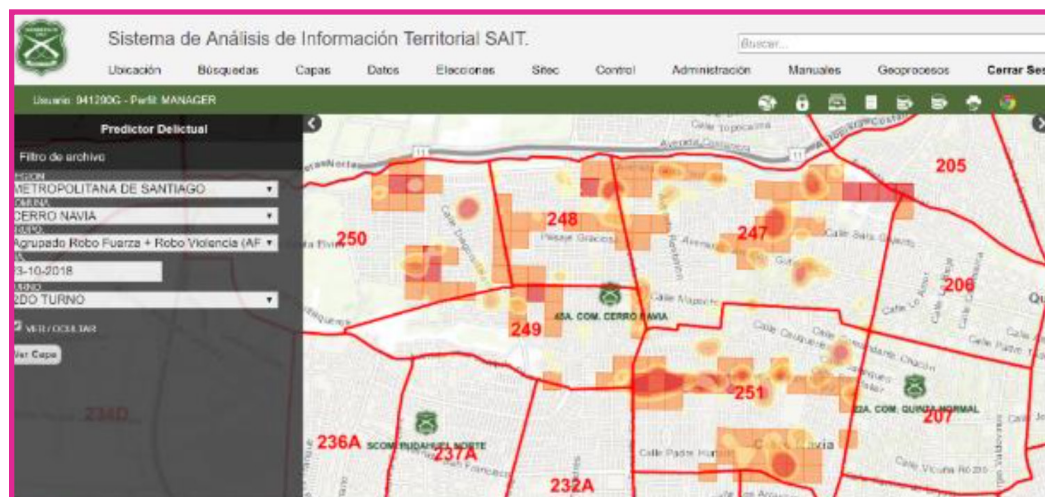


Figure 2: SAIT 2.0 interface (Santos, 2018). Combined display of hotspots (oval markings) and crime predictor (rectangular markings) for a sector in Cerro Navia.

The algorithmic model developed by CEAMOS is based on methods like repeat or near-repeat victimization which work on the assumption that there is a higher probability of a crime occurring near the places where crimes currently occur (Baloian et al., 2017). These models include Promap, developed by UCL (UK), and UCLA's PredPol (USA). Other methods based on geospatial techniques permit the introduction of new layers of information—such as context data—to crime maps (Baloian et al., 2017, p. 3). This is the case for the RTM (Risk Terrain Modeling) method developed at Rutgers University (USA) (DNOS and DAC, n/d).

According to the developers, their system combines two approaches to the design of crime prediction methods: expert system and machine learning. The first seeks to encode knowledge experts have

on the occurrence of crimes in the system, whereas the second enables the algorithms to discover patterns based on available data (Baloian et al., 2017, p. 3). By defining a set of rules and a dataset, the experts define a framework for the machine to operate under and to recognize criminal patterns that will later guide police in the field. In this case, the set of rules defined are three algorithms that integrate a model for the preparation of risk surfaces. They define the importance of the variables and assumptions related to the probability of a crime occurring in a certain time-space.

The three algorithms³⁴ comprising the model individually process the data and jointly construct the final risk surface. For each case, time was organized based on the police officers' three daily 8-hour shifts.

- i) **Prospective Method:** A method based on repeat and near-repeat victimization whose premise establishes that future crimes have a greater probability of occurring in the vicinity of current crimes, defining spatio-temporal zones of greatest risk based on historic criminal data. According to the Carabineros, the method finds its origin in the software developed by Kate Bowers, Shane Johnson and Ken Pease at University College of London, which they called Promap (Pizarro, 2021). In fact, Shane Johnson and his team supported CEAMOS in the construction and application of this system. In this case, the data are extracted from the Carabineros' crime database for each township in Santiago and other large cities around the country, including context-relevant data such as bus stops. The cells they build consider the geographic and temporal distance of the event from the center of the cell. The events most distant from the center have less influence on defining the function's risk. The space was charted in 300 m² cells, and the time contemplates a 2-month frame.
- ii) **Dempster-Shafer theory of evidence (Expert systems):** A method used to test the validity of a hypothesis when evidence gathered for cases of "variables that are affected by uncertainty" is used (Baloian et al., 2017, p. 4). In this case, two hypotheses are tested: 1) the repeat behavior of criminals and victims, which make it possible to establish that it is probable a crime will occur in the same place and time at which a crime occurred in the past; this hypothesis is evaluated using Carabineros' historical data (Baloian et al., 2017); and 2) context factors that ease the occurrence of a crime. This hypothesis is estimated "using data on amenities in the city from crowdsourced sources such as Open Street Maps. An analysis of the coexistence of amenities and crimes shows that the most important services are banks, bus stops, restaurants and ATMs" (Baloian et al., 2017, p. 4). Based on this, in each cell a confidence value is generated which is reported as the risk value. On average it takes 23 seconds to process the result, which is considered nearly real time (Baloian et al., 2017).

34 For more information on the algorithmic system, see Baloian et al. (2017).

- iii) Multikernel: Characterized by “using information of the spatio-temporal occurrence of criminal events to generate a dynamic risk intensity function, which indicates the location where the probability of occurrence of future criminal events is concentrated” (Baloian et al., 2017, p. 4).

Each of these methods can discover distinct criminal patterns, building different risk surfaces. The developers have combined the three methods to achieve a better predictive result, where “a successfully predicted crime is a crime which occurs in an area marked as highly risky by a prediction method” (Baloian et al., 2017, p. 5).

To define the system variables, CEAMOS applied a questionnaire to Carabineros officials with questions oriented to understanding the temporality (schedules, shifts, days of the week); the operation of police units; the types of crime; and the characteristics of different spaces and services, among other features. They held regular meetings with the DAC team and received advice from a consultant with a doctorate in mathematics to validate the algorithms used and the system metrics (Pizarro, 2021). As a result, the risk surfaces that the algorithms produce are shown in 150m x 150m cells, corresponding to the Carabineros patrolling unit, that chart the areas of highest probability of the occurrence of crimes. The cells change every eight hours, corresponding to three daily police shifts. This means that the predictions change every eight hours according to the data corresponding to this timeframe. In addition, they are continually adjusted with the new data incorporated into the system.

Measuring the model’s performance was done using a simulation in which the prediction made for a given shift was compared to the real data obtained from Carabineros databases (Baloian et al., 2017). This evaluation process was conducted based on data from police cases (mainly robbery with violence) in different townships,³⁵ measuring the effectiveness of the prediction as a percentage of the number of real criminal acts that occurred within the determined time–space, using a past scenario. The simulation included 180 searches within a representative dataset for each township, with an average time of 30 seconds. The Carabineros required around 30% effectiveness from CEAMOS. In Santiago, an average of 77% effectiveness was found; while the average for other cities was 45.29%, ranging from 35% to 50%.

Figures 3 and 4 illustrate the simulation process in two townships with different results. The second case is interesting because it shows a situation where “the algorithms could not anticipate that part of the criminal activity shifted to minor streets (parallel to the main avenue). This could be caused e.g. by sudden changes in preventive patrol schedules or by an exogenous input that affects the behavior of offenders and which has not been included explicitly in any of the models” (Baloian et al., 2017, p. 8). This example sheds light on what the developers consider to be factors defining changes in crime patterns, specifically demographic and geographic factors that reduce the system’s prediction capability (Baloian et al., 2017) and which are not specified by the developer team, possibly due to the fact that there are multiple variables which may affect these changes.

35 The specific ones are not identified; however, it is likely they are the townships in which the pilot would later be conducted.

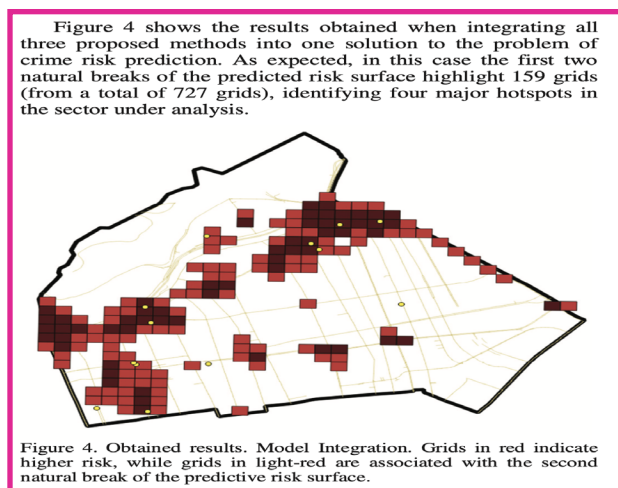


Figure 3: Map of the predictor model simulation with 77% effectiveness in a Santiago township (Baloian et al., 2017). The yellow dots indicate the geolocalization of the crimes.

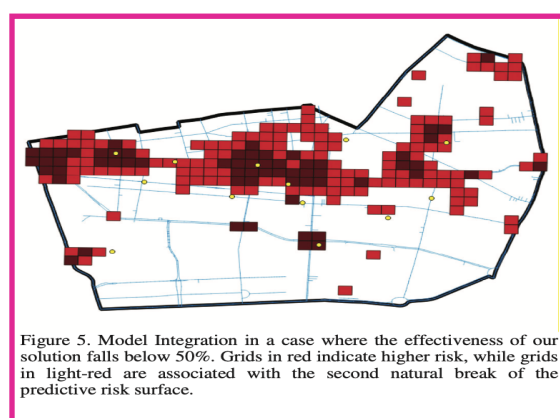


Figure 4: Map of the predictor model simulation with 46% effectiveness in a Santiago township (Baloian et al., 2017). The yellow dots mark the geolocalization of the crimes.

The system does not work in the case of cities with an average below three daily police cases, since they lack sufficient data to identify patterns (Baloian et al., 2017). In addition, it is possible that an unexpected change in the type of crime may occur, which significantly decreases the system's predictive capability until the data are adjusted to the new situation. It bears mentioning that due to the time-based limitations for developing the project, it was not possible to adjust the optimal spatio-temporal limits for the predictive method (Baloian et al., 2017).

Following approval of the predictor model's performance, it was incorporated into the Carabineros SAIT platform to conduct a pilot in nine townships of the Metropolitan Region,³⁶ selected according to their crime rate and geographic location (Pizarro, 2021). In the documentation reviewed and the interviews conducted, neither the pilot process nor its evaluation were able to be described in more

36 Conchalí, Estación Central, Las Condes, La Florida, Maipú, Puente Alto, Peñalolén, Santiago and San Bernardo.

specific detail. Neither were there grounds explaining why the pilot was modified in relation to the specifications of the system's technical bases, in which developing a pilot evaluation was proposed, which would take two pairs of townships with similar characteristics to contrast between one in which the system was applied and the other that functioned as a control (DNOS and DAC, n/d).

The first pair of townships was San Bernardo and Puente Alto, correlated by sociodemographic characteristics such as similar percentages below the poverty line and a history associated with an urban space showing spatial segregation problems, displacement and precarious infrastructure due to how these locations mainly absorbed populations uprooted in the “Basic housing for the eradication of settlements program” (DNOS and DAC, n/d, p. 6). The second pair included Conchalí and Renca, whose similarities were based on the number of inhabitants, socioeconomic level and urban infrastructure (DNOS and DAC, n/d). While this type of comparative pilot was not implemented,³⁷ its proposal reveals two things. First, the intention of evaluating the system in relation not only to its predictive capability but also to its impact on a reduction in crime rates. This impact could not be observed, and no later audit process was proposed to analyze it. Second, the proposed pilot shows that there is knowledge at the Carabineros of the socio-urban segregation that exists in the city of Santiago, as well as the problems the segregation poses. Accordingly, it is worth asking why these questions are not incorporated in the software development process and how this could reinforce such differences, especially given that what the algorithms produce are red zones for surveillance and control in a city whose inhabitants have disparate experiences of policing partly based on this socio-urban segregation (see Han, 2017). In addition, the decision to choose townships of low socioeconomic levels as laboratory spaces for the system also reproduces the socio-urban segregation that has been identified.

Despite these questions, the system was installed in 58 townships that had sufficient quantity of data to implement this kind of predictive methodology. To install it in precincts, there were technical training sessions led by CEAMOS for DAC personnel³⁸ for “support and maintenance of the system, databases and configuration of applications and services” (Carabineros de Chile, Public Procurement Division, n/d, pp. 7–8). DAC personnel would then be responsible for teaching the system's operation to officials in operations offices at the precincts. Following the software test and integration into the Carabineros SAIT 2.0 platform, the CEAMOS team contemplated eight months of project support to make any needed adjustments (DNOS and DAC, n/d), after which it would completely disengage from the project. According to an engineer interviewed, this is the best way of working: “Our idea is to sell the product and then they take responsibility. We give them all the tools to do it that way”³⁹ (Interview, 2021; translation). On the one hand, this allows for the creation of an independent process and for the Carabineros to take control of the system. On the other hand, it

37 According to the published documents and interviews conducted, no mention is made of this process or its results.

38 According to the technical bases, the training plan had to consider a quantity of 15 spots for administrators and advanced users, and a quantity of no less than 3 spots for support managers (Carabineros de Chile, Public Procurement Division, n/d, pp. 7–8.)

39 The kind of sale of security prediction software has taken place in both the public and private spheres. CEAMOS developed a similar model for the Mall Plaza chain.

reduces the engineers' liability in relation to the system they are building and implementing and its consequences in policing practice when it is installed in precincts.

Installation of the system in precincts

When the predictive system was presented on television, a mathematical formula was projected over video footage from the body camera of a carabinero on preventive patrolling, to highlight how the police route is not random, but rather guided by this algorithmic operation. However, in daily practice there is a constant dialog between human and algorithmic decisions. That is what happens at the Operations Office (OO) of each precinct where the predictive system has been installed.

The OO is a technical agency responsible for analyzing the information available, to be able to advise the precinct commanders on planning police services, such as the distribution of the “surveillance means” in the field (on-foot or motorized police officers, etc.), according to the analysis conducted (Carabineros de Chile, 2017b). Since 2013, the OO's funding has increased to incorporate civilian analysis in areas of data processing (criminal analysis and management control), territorial analysis (studying the spatial profile) and social analysis (identifying modus operandi and victim and perpetrator profiles).

There are two main lines of analytical action at the OO based on available information: 1) establishing places, days and times when there is a greater probability that crimes will be committed and 2) determining the profiles (basic typical characteristics) of the victim, the criminal and the place where crimes are committed (Carabineros de Chile, 2017b, p. 14). According to the Carabineros (2017a), this will enable the targeting of police services through an efficient distribution of resources in the field with a focused and informed police officer bringing the prevention strategy to life. For this purpose different police data analysis platforms are used (see Annex 1). One of the main platforms is SAIT, where it is possible to display different types of geolocalized information (see Annex 5). In addition to the predictor and the hotspots, it is possible to access detailed information on each crime and offender (including personal and residential data), police reports, and information gathered by police officers in the field, as well as tracking their routes.⁴⁰

40 Real-time display of the carabineros' route is not currently available due to the cancelation of the SIMCCAR service as of March 2021. Currently, the Carabineros are developing a new application to replace SIMCCAR.

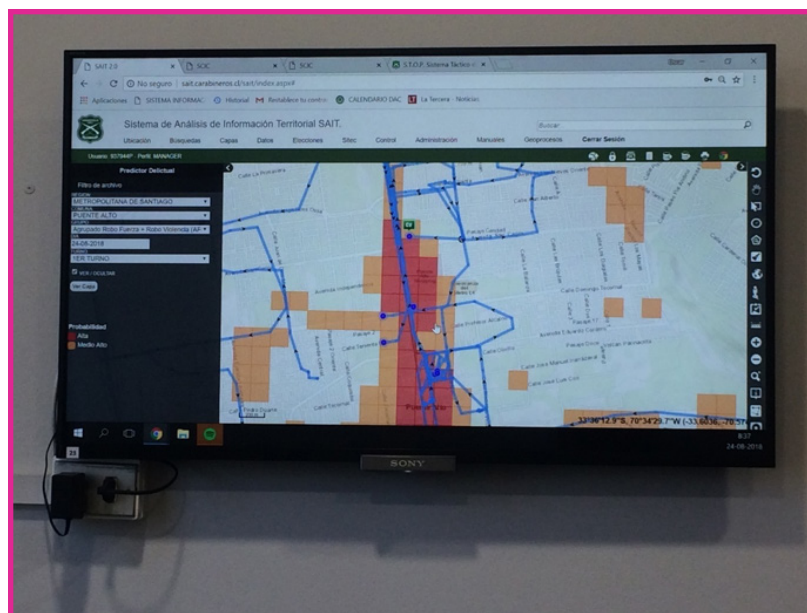


Figure 5: Display of the crime predictor on the SAIT 2.0 platform on a screen at the Crime Analysis Department (Josefina Buschmann, 2018).

The grid of orange and red defines the zones of highest risk. The blue lines represent police officers' patrol routes in the territory, georeferenced using SIMCCAR real-time GPS. The blue dots show the current position of each carabinero. This display is not currently available due to the cancellation of the SIMCCAR service as of March 2021.

To define zones for greater police surveillance and control, the different sources of information are weighed. This includes data coming not only from information systems like SAIT, but also from the Community Integration Office (OIC)⁴¹ and from data collected by police officers in the field. In this process, information appears that is related to the dark figure of crimes not recorded in any of the information systems and also to zones of low concentrations of crime⁴² (Carabineros de Chile, 2018).

The Carabineros have noted the existence of a tension between the algorithmic and the “human” in operational decision-making for allocating resources in the territory, due to the fact that a large proportion of them depend in the end on police commissioners, who make decisions based on their experience, leading to the continuity of good practices being diluted and the variability of

41 The OIC bases its working strategy on the Carabineros-Community Integration Model (Modelo de Integración Carabineros-Comunidad, MICC), understanding community integration as the set of actions that the institution takes with the community in order to: Obtain useful information for crime prevention; identify problems affecting the community; and jointly seek solutions, creating a feeling of co-responsibility and co-participation. An example of these community integration actions are the meetings with local authorities and community organizations (neighborhood councils, sports clubs, etc.), interviews and surveys, participation in local networks, massive information gathering activities, socio-educational talks, workshops and training sessions, recreational activities of a preventive nature, safety campaigns, publicity campaigns, identification of risk factors, etc. (Carabineros de Chile, 2018, p. 111).

42 These zones do not appear on the hotspots map or the crime predictor due to their small number.

the strategy and its results being too high (Carabineros de Chile, 2021b, p. 20). To transform these practices, the latest strategic plan for institutional development has proposed the need to strengthen the partnership with academia to deliver technical tools to police unit leadership, in turn reinforcing evidence-based analysis optimized by a mathematical programming model (Carabineros de Chile, 2021b, p. 20). However, these new policies do not take into account the problems associated with the information systems themselves, which are warned of in the institution's daily practice, and which are even in contradiction with the Carabineros' community integration model.

In the midst of these human and algorithmic intersections and tensions, the red zones for surveillance and control are defined to guide police actions on each shift through the "Situation Card" carried by each police officer in the field (see Annex 5). This tool contains an assessment of the criminal dynamic in the sector, incorporating risk factors, victim and criminal profiles, and temporal and spatial aspects of criminal behavior (Carabineros de Chile, 2018, p. 211). Victim and perpetrator profiles are described by sex, age and—only in the case of the offender—physical characteristics such as height and skin color. There are aspects of the Card that are modified on each shift (such as specific tasks to carry out and the crime red zones) while others, like the criminal analysis,⁴³ are valid for 15 days. The card also considers specific tasks to be developed in each zone, such as interviews with residents, inspection of locales and identity checks. The latter are focused according to the crime red zones in order to carry out preventive work in the sectors of concentrated crime and at the time needed (Carabineros de Chile, 2018, p. 218).

Identity checks can be investigative⁴⁴ or preventive.⁴⁵ The application of preventive identity checks to people over age 18 is a power authorized since 2016 that allows checking and detaining any person, with no need for any kind of justification. This type of check is a controversial instrument, due to possible discriminatory uses based on sex, race, ethnicity and socioeconomic level (Duce and Lillo, 2020). There is little public information that would allow an assessment of both its results and its effects on human rights since the data published are not disaggregated and there are no known regular public evaluations (Duce and Lillo, 2020), despite the fact that the number of checks has increased significantly in recent years (Miranda and Pérez Campbell, 2021). Of the 7.3 million people checked during 2020, 96% of checks were preventive and of the total, only 166,000 people ended up arrested due to warrants for arrest and for the commission of crime in the act (Carabineros de Chile, 2021a).

43 Criminal analysis is based on crime statistics present on the PACIC platform and indicates the two crimes with greatest presence in the quadrant.

44 The current article 85 of Law 19,696 which establishes the Code of Criminal Procedure on Identity Checks, allows the police to check the identity of any person, of age or underage, to frisk them (including clothing, baggage and vehicles) and to detain them for up to eight hours when there is any suspicion that the person may have committed or intended to commit a crime. This power has been authorized since 1998. In practice, this kind of check also functions as a tool that is more preventive than investigative in nature.

45 Law 20,931, amending article 85 of the Code of Criminal Procedure and introducing the mechanism known as preventive identity check in its article 12.

Following a legal process, Mauricio Duce and Ricardo Lillo (2020) managed to access a database⁴⁶ on the identity checks, facilitated by DAC, which enabled them to evaluate the effectiveness and potential discriminatory use of this practice. The data analyzed show that it is a measure of limited effectiveness, and which promotes police work of much lower quality that is characterized by a poorly focused intervention that finally has led to giving priority to detentions for minor offenses or that even are not even of a criminal nature (p. 191). In addition, they explain that its use would be discriminatory against foreigners, women and residents of poorer townships (p. 167), which is in line with the analysis of Benjamín Miranda and Graciela Pérez Campbell (2021), who note that there are more checks and fewer arrests in townships with limited resources.

Analyzing identity checks in the context of the predictive system is relevant because the former is one of the fundamental practices coordinated and focused, in part, by the algorithmic model developed to define the highest risk zones which therefore have the greatest surveillance and monitoring. The system's incorporation leads to a particular way of organizing police practice based on high-risk zones. As academicians Amorre and de Goede (2008) have observed, risk is a construction, a way of governing and being governed. Risk is performative, producing the effects it names. Thus, police problems are understood in terms of risk management. It is no longer just statistics and geolocalization of past crimes that inform the planning of their actions, but also the projections of possible situations that create red zones. In this sense, the system's algorithms not only predict crimes, but also function more as "algorithms of crime production" (Benjamin, 2019, p. 171), enacting what they forecast through the guide to police operations in the field. In particular, surveillance and monitoring end up performing the anticipated future (Bruno, 2021). The automated production of risks operates as a silent infrastructure that naturalizes their presence, in particular because it requires "the least human intervention" (Orchard, 2018) to create the spatio-temporal patterns. And while at first glance policing practice may not seem to change much with the incorporation of the predictor, there is a silent, hidden operation that happens at an infrastructure level, which may be participating in discriminatory practices that are difficult to audit publicly.

In the following section the critical points analyzed on the crime prediction system are reviewed and summarized.

46 The database includes the total number of identity checks conducted in the period of one full year from April 2017 to March 2018 and containing the records of 3,630,936 checks under article 85 of the CCP and preventive ones (Duce and Lillo, 2020, p. 170).

4. CRITICAL EVALUATION OF THE SYSTEM

This investigation has analyzed the social construction of the urban crime prediction system based on the associated narratives, materialities and practices, examining its main infrastructure—data and algorithms—and how the system is incorporated into daily police work. Throughout, it can be seen how plans are overtaken by lived experience, highlighting the importance of the context with which the system and its potential risks in terms of ethical and human rights issues are intertwined. Based on this exploration, the following presents a synthesis of three critical aspects of the system: 1) data production; 2) evaluation and transparency; and 3) predictive surveillance and monitoring in a segregated urban context.

Data production

As we have seen, there is no such thing as “raw data,” neutral and objective (Gitelman, 2013). All data involve a social production chain that starts with their collection and organization and goes through classification and protection. Certain contextual perspectives and values get incorporated during the process. It is critical to keep this in mind when analyzing data-fed algorithmic systems. In this case, the main data production context is the Carabineros as an institution, which in its daily practices feeds the AUPOL platform.

Despite the importance of these data and their production context, there was no evaluation methodology of any kind provided by the CEAMOS team for analyzing in the developed software the practices for creating these data and their consequences. Moreover, the quality of the Carabineros database is taken as a given simply due to the volume and georeferenced nature of the data (Baloian et al., 2017). However, this investigation has identified three main problems related to the database.

The first has to do with a series of inconsistencies in and absence of data. On the one hand, the way in which the data are collected and preserved in the AUPOL system affects the data's integrity, as shown in the audit conducted by the Office of the Comptroller presented in Section 3. This is related, in turn, to the fact that the Carabineros' information systems are not integrated (Carabineros de Chile, 2021b), which leads to the data passing through various digital and manual processes that not only complicate their real-time use, but also create problems with their quality and traceability. On the other hand, the dark figure of data corresponding to approximately 60% of crime complaints that go unreported, leads to an absence of information relevant to the operation and evaluation of the system. Although this issue is raised by the Carabineros, it was not taken into account when the system was developed. These inconsistencies and omissions of data create a fundamental problem at a technical level.

The second consideration has to do with the type of police data used, i.e., CMSS-related complaints and crimes. While these data are relevant to estimating criminal risks, it is essential to analyze the context of their production. This is because there are potential problems associated with irregular procedures such as wrongful or arbitrary arrests, or over- or underestimated complaints. This can lead to the database being biased and reproducing discriminatory practices related to the intensification

of preventive identity checks and surveillance in the red zones. One option for improving these data is to filter using other variables, such as final conviction in the case of arrests. Even so, it would also be necessary to assess issues linked to the legal context.

Finally, and cutting across the above-mentioned points, it has been seen that there is no evaluation or external audit protocol for the Carabineros' data collection practice, a procedure that is a central part of today's police practices, guiding both their daily activities and the evaluation of the outcome of their operations. Incorporating this kind of audit is fundamental to improving the process in both technical and social dimensions.

All the areas mentioned produce “dirty data” in the prediction system, i.e., data subject to forms of uncontrolled manipulation that complicate the system's socio-technical operation. This is a problem revealed by several studies of police agencies that use crime prediction systems (see Brayne, 2021; Richardson, Schultz and Crawford, 2018; Jordan Jefferson, 2018) and that must be urgently considered in the local context.

Finally, it must be emphasized that data production problems are neither limited to nor resolved with purely technical approaches; they are connected to and depend on the organizational practices into which they are integrated (Brayne, 2021). The problem of incorporating police data into an automated technical system and as part of statistical databases is that they are given new life as data with scientific validity, leading to differential monitoring systems based on their results which often tend to reproduce discriminatory practices (Jordan Jefferson, 2018). Accordingly, it is extremely important to open the police data production process up to civilian scrutiny and generate external audit procedures.

Although there are currently various initiatives to open police statistics up to citizens—such as the STOP platform and the Carabineros public account—these mechanisms continue to obscure the complex process of data production, legitimizing the data's validity through this opaque transparency. Even if the data are shown, it is only possible to access figures that are taken as statistically valid but fail to follow clear and transparent methodological protocols for civilian control. Furthermore, the data provided are not disaggregated by key variables like sex, age or nationality which are essential to analyzing potential biases in data on arrests and complaints.

Evaluation and transparency of the system

A complex aspect of the installation of artificial intelligence systems is the ways they are evaluated. These systems are fairly opaque in their mode of operation and tend to become sealed “black boxes” once they take on the role of infrastructure. It is thus necessary to define clear internal and external evaluation methodologies for the system that can assess not just its technical operations but also its expected results and impact in terms of proposed objectives, as well as the potential risks and benefits for the human rights of those who could be affected by the system.

The first point to mention is that currently the only way to evaluate the system is using internal audits that define its functionality based on the comparison of predicted risk surfaces with the result of

the crimes committed for the date and time of prediction, obtaining results of over 40% success in most cases (Pizarro, 2021). It does not specify the cases in which this percentage is lower, nor if that percentage is known in those precincts. A warning could be incorporated into the SAIT platform for the times when the predictor is operating below expected performance. Up to now there seems to be no clear way of detecting errors in the system beyond variation in the success rate, which is conducted a posteriori. No external audits or evaluations have been conducted by the Office of the Comptroller or another agency, and there are no plans to conduct them in the short term. This is linked to a widespread problem with the police that is rooted in the lack of transparency and civilian control over the forces and their procedures. The positive of the system in this case is that the algorithm is not private, but rather under Carabineros command, which allows it to be audited if the institution or the Office of the Comptroller deem necessary.

As regards the evaluation of results in terms of the reduction of crime rate, to date no mechanism has been implemented to evaluate the utility of the technology for the proposed purpose (Pizarro, 2021). Alongside this, there is a problem in the methodologies traditionally used to corroborate the system's results (Brayne, 2021). On the one hand, if it is confirmed a posteriori that the percentage of predicted police cases coincides with those that did occur, then the police presence did not lead to changes in the pattern of crime even though the system works correctly. On the other hand, if crime drops, then there is a mismatch with the predictive system and its validation percentage is not met. Both methods have been used to verify the operation of these systems (Wang, 2018). In addition, crime does not necessarily decrease; it may instead be displaced to other areas, creating new crime zones. Moreover, the causes of crime are multi-factor, due to which it is not possible to corroborate that the drop is related to the system. Control townships are not used, either, to compare the predictor's effectiveness. Accordingly, the system's results are not related as much to the drop in crime, as to the allocation of police resources and a possible reduction in the feeling of insecurity. To corroborate changes in the feeling of insecurity, ENUSC results could be compared to the zones where the predictor has been applied.

Finally, the Carabineros as an institution do not believe that the model could have any kind of impact on individual rights or on ethical issues or intrusions related to surveillance for the simple fact that it neither uses personal data nor enables the identification of exact locations of events that affect them (Pizarro, 2021). The problem is that in the defined patrol areas, surveillance and control are intensified, which also intersects with criminal profiling and could be linked to intensified discriminatory practices in those red zones. This is something that has been noted particularly through the analyses presented on preventive identity checks and by the socio-urban segregation that exists in a large proportion of cities in Chile, a point that will be further explored below.

Red zone for surveillance and control in a segregated urban context

One of the main objectives in incorporating the system is to plan police recourses effectively and efficiently to improve preventive patrolling and, eventually, reduce the crime rate. Thus, the project was seen as a purely technical, mathematical question. In the words of one of the CEAMOS engineers who participated in development of the system: "We saw them as simply engineering projects. I personally have no interest in connecting them to the problems that you in sociology might have,

because everyone knows his or her own field” (Interviewee 3, 2021; translation). However, as has been shown throughout this investigation, there is no purely technical system that operates on the margins of the societal. Each system is the product of and reproduces social structures that manifest in specific forms. In this case, they produce disparate securitization zones characterized by the intensification of surveillance and control.

In an urban context marked by socio-urban segregation, it is essential to ask oneself about the consequences that the building of algorithmic maps could have for the inhabitants of each territory. Space can be a proxy for social categories such as race, class and ethnicity (Wang, 2018), especially on an uneven playing field and in sectors whose residents have to face a life defined by continual policing and militarization (Han, 2017). While the use of predictive analytics offers the possibility of decreasing discriminatory biases in police practices, this will depend on the data underpinning the system and, above all, on the context into which they are incorporated. As we have seen, the local panorama is fairly complex on both points. Incorporating this kind of predictive mapping in this context can entrench and legitimize discriminatory police practices along lines of race, class and nationality, among others, by creating new rationales that justify differential police practices.⁴⁷

Creating differential zones for surveillance and control can lead to changes in behavior in both police and residents. On the one hand, it is worth wondering about the state of a police officer patrolling red zones at high risk of crime and how this may condition his or her actions. It may increase checks and disproportionate arrests of people who fit the sociodemographic profiles previously defined by the operations office on the situation card. This could mean harassing people who have committed no crime but whose behavior is considered suspicious, justified by an instrument classified as objective (Brayne, Rosenblat & boyd, 2015), all of which goes against the presumption of innocence, equality before the law and freedom of movement. To better understand this process, an ethnographic study is needed to capture these behaviors in the field, complemented by a comparative analysis of disaggregated data on identity checks and arrests together with interviews with residents of the neighborhoods under greatest surveillance and control.

On the other hand, surveillance can affect the behavior of people who walk in these red zones, especially those who belong to social groups that are monitored and checked with greater intensity, i.e. people of color, people from the LGBTQIAP+ community, young people, people living in poverty, and other groups who do not fit into the stipulated order (Eubanks, 2017). Surveillance and monitoring are not conducted in the same way in every territory or on every person, and there is a long history of discrimination accompanying with these practices (Browne, 2015; Han, 2017).

Despite international evidence gathered by researchers since 2015,⁴⁸ no consideration was given to ethical and human rights issues in the system’s development; not by the government, not by the Carabineros and not by the engineers. When developers fail to address the social context this can lead to what the Princeton scholar Ruha Benjamin (2019) has called “discrimination by default”:

47 See, for example, the investigation conducted at the Chicago Police Department by Jordan Jefferson (2017).

48 See, for example, the investigation of Brayne, Rosenblat & boyd (2015).

the knee-jerk integration of biases in the system that leads to reproducing the exclusion of certain social groups. In this sense, “computational depth without historic or sociological depth is superficial learning”⁴⁹ (Benjamin, 2020). It is necessary to integrate these perspectives to successfully develop fair technology. This is because the same technologies can be used to transform existing inequalities or to amplify them (Brayne, Rosenblat & boyd, 2015).

Keeping these inequalities in mind is of utmost urgency since there are different crime prediction systems being incorporated. CEAMOS, for example, designed and implemented a model at Mall Plaza; while the Pontificia Universidad Católica de Chile is developing a joint proposal with the PDI to include a predictive system for identifying criminal behavior based on conviction data (Van ‘T Wout et al., 2018). This system is even more problematic because it is based on personal data and directly targets individuals.

Therefore, when this kind of technology is installed, it is necessary to conduct an algorithmic impact assessment with an intersectional perspective and human rights approach, which also includes citizen engagement, considering the effect that the system could have on the groups who run the greatest risks. To this end, interdisciplinary teams must be created to design and evaluate these systems in their different fields.

49 This quote is a play on words that makes reference to one of the artificial intelligence techniques known as “deep learning.”

5. FINAL REFLECTIONS: MAP AND TERRITORY

“The map is not the territory”
Korzybski, 1933.

A map is a representation of a territory and has agency over it. The map produces territories; it transforms them according to a vision of the world that is proposed through it, and which directs movements on the ground. The reality we inhabit is composed of a complex web of representations spun by materialities, meanings and power dynamics. Therefore, there is always a “policy of representation” (Deutsche en Kurgan, 2013, p. 18) at play in each of the devices that are created and act in the world. Both the map and artificial intelligence have at their heart the construction of a system of representation. For this reason it is critical to analyze how these devices are built and identify their impact in those spaces and their inhabitants, going beyond techno-utopias or techno-dystopias like *Minority Report*. Technologies are part of the problem, but also of potential societal transformations.

In the case of this investigation, we have seen the design and implementation of a predictive technology that builds, based on police and environmental data, algorithmic maps of criminal risks; these guide, in part, the movements of police officers on the ground and their surveillance and control actions in the city. The development of these technologies is relevant since they affect daily police practices, which require methodologies, protocols and systems that allow them to make efficient, effective and ethical use of limited resources. Beyond a critique of the development of this technology, this investigation discusses the way in which this system is designed and implemented unquestioningly and how it covertly seeks to resolve institutional issues that require another kind of organizational transformation. In the analysis process, a series of problems presented in the previous section was revealed. Considering the issues identified, this final reflection emphasizes two spheres in the context of police institutions in crisis: data and security.

One of the basic practices of both the development of artificial intelligence technologies and police activity is data production. Although there is a series of problems associated with the production of these data that have been gathered on this case, it is of utmost importance that the data be produced to enable evaluation of police work and guide their daily actions. This is a practice that exists now and will continue to exist, due to which it requires special care in its operation. It becomes necessary to define protocols that place ethical and human rights considerations at the heart of data production. To that end, the first is taking into account the context of data production, defining methodologies that include constant supervision by outsiders in the form of audits or other kinds of civilian control guaranteeing their due process. Moreover, it is necessary to rethink the kind of data that are presented publicly—especially including disaggregated data related to Carabineros malpractice and preventive identity checks—and that are incorporated into the predictive system. Even if the data have been collected correctly, it still remains to inquire into the effects the integration of predictive technologies can have, and if their benefits are greater than the associated risks. The existence of technologies on the market does not make it necessary to implement them, nor guarantee they will improve policing practice. The possibility must exist for institutions, civil organizations and

affected individuals to refuse the integration of conflictive technologies or those that have not been adequately tested (Crawford, 2021). For this it is necessary to integrate binding citizen engagement mechanisms for evaluation of the system, which especially take into account those who may be principally affected by it.

In addition to questioning the technologies, it is germane to analyze the concept of security that motivates them. With an eye on the constitutional process, it is urgent to challenge the current concept of security in which maintaining order and control prevails over protection of human rights. It is worth asking what would happen if security were more linked to care than to control. (Foulkes, 2021). How would this transform security policies? How would these modifications materialize in security practices and their technologies? Today police reform functions more as a euphemism for modernization without a deep transformation of the institution's practices, transparency and civilian control over them, citizen engagement, and the ideas that inform them. In this context, technologies reproduce systemic failures and further hide processes through the automation of their processes as infrastructure. To successfully make deep changes, it is urgent to build other maps for navigation: representations that operate under the idea of care and not punishment.

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Legislação

- Decreto 899** que aprova o regulamento para o funcionamento do Banco Unificado de Dados do artigo 11 da Lei 20.931 que facilita a aplicação efetiva das penas estabelecidas para os delitos de roubo, furto e receptação, e melhora a ação penal em tais delitos. <https://www.bcn.cl/leychile/navegar?idNorma=1137086>
- Lei 18.961** — Lei Orgânica Constitucional da Carabineros. <https://www.bcn.cl/leychile/navegar?idNorma=30329>
- Lei 19.628** sobre a proteção à vida privada. <https://www.bcn.cl/leychile/navegar?idNorma=141599>
- Lei 9.696** que estabelece o Código de Processo Penal <https://www.bcn.cl/leychile/navegar?idNorma=176595>
- Lei 19.880** que estabelece bases de procedimientos administrativos que regem os atos dos organismos de administración do Estado. <https://www.bcn.cl/leychile/navegar?idNorma=210676&idParte=8512607&idVersion=>
- Lei 20.285** sobre o acesso à informação pública. <https://www.bcn.cl/leychile/navegar?idNorma=276363>
- Lei 20.521** que modifica a Lei 19.628, sobre proteção de dados de caráter pessoal para garantir que a informação entregue através de modelos preditivos de risco seja exata, atualizada e verdadeira. <https://www.bcn.cl/leychile/navegar?idNorma=1028013>
- Lei 20.575** que estabelece o princípio de finalidade no tratamento de dados pessoais. <https://www.leychile.cl/Navegar?idNorma=1037366>
- Lei 20.931** que modifica o artigo 85 do Código de Processo Penal e introduz o mecanismo conhecido como controle preventivo de identidade em seu artigo 12. <https://www.bcn.cl/leychile/navegar?idNorma=1092269>
- Lei 21.096** que consagra o direito à proteção dos dados pessoais. <https://www.bcn.cl/leychile/navegar?idLey=21096>
- Lei 21.105** que cria o Ministério da Ciência, Tecnologia, Conhecimento e Inovação. <https://www.bcn.cl/leychile/navegar?idNorma=1121682>
- Lei 21.180** sobre a Transformação Digital do Estado. <https://www.bcn.cl/leychile/navegar?idNorma=1138479>
- Lei 21.332** que implementa um Sistema Tático de Operação Policial <https://www.bcn.cl/leychile/navegar?idNorma=1160943>

ANNEXES

Annex 1: Carabineros Information Systems

Figure: Carabineros information systems for the Quadrant Plan for Preventive Security

Source: Author's work based on Carabineros de Chile documentation.

System Name	Description
AUPOL (Automatización de Unidades Policiales) [Police Unit Automation]	<p>AUPOL is one of the institution's main databases, a platform that facilitates the registration and storage of information regarding: Complaints, Arrests, Records and Violations, among others. This system in turn facilitates generation of the respective police reports that are provided to the different Courts and Public Prosecutors in the country (Office of the Comptroller, 2019, p. 55).</p> <p>In the AUPOL DIGITAL version of the program (operational in 63 precincts of the Metropolitan Region as of 2017), the information is available for access by the Prosecution Authority (Ministerio Público) via its Public Prosecutor Support System (Sistema de Apoyo a los Fiscales, SAF) (Office of the Comptroller, 2019, p. 55).</p> <p>In 2017, AUPOL 2.0 was under development by the GTD INTESIS S.A. company.</p> <p>At the precinct level, it is divided into two platforms:</p> <p>AUPOL Management Control System: A platform that makes it possible to display the police reports that are entered on duty to read them and retrieve non-parameterized qualitative information, such as modus operandi (Carabineros de Chile, 2017a, p. 142).</p> <p>AUPOL Data Transfer System: A platform making it possible to download the list of all the crimes and their variables that are entered during on-call duty, such that these data can be analyzed using programs like Excel (Carabineros de Chile, 2017a, p. 137).</p>
PACIC (Plataforma de Análisis Criminal Integrado de Carabineros) [Carabineros Integrated Crime Analysis Platform]	<p>PACIC is an institutional platform that compares cumulative crime statistics regarding the same prior period (weekly, monthly and annually) (Carabineros de Chile, 2018, p. 130). It enables determining which crimes are of priority in the Unit's sector (Carabineros de Chile, 2018, p. 183) based on statistical time comparison that observes weekly, monthly and annual absolute and percentage variation of police cases, and a reference regarding behavior of the last 5 years. It also indicates the threshold that shows whether the variation is within a normal range according to the occurrence of crime of the last five years (Carabineros de Chile, 2018, p. 183).</p>

System Name	Description
SAIT (Sistema de Análisis de Información Territorial) [Territorial Information Analysis System]	SAIT is a platform that geolocates information from police cases (arrests and complaints) to focus and streamline available resources for better decision-making (Carabineros de Chile, 2017a, n/p) at the precinct. It enables displaying on a map the location and concentration of criminal events in different temporalities (Carabineros de Chile, 2018, p. 180). It is possible to select type of crime to define the zones of high criminal commitment according to defined typification. (Carabineros de Chile, 2018, p. 185). On this platform the crime hotspots are processed, and the crime prediction system is integrated to generate the dynamic risk maps.
SIICGE (Sistema Integrado de Información y Control de Gestión) [Integrated Management Information and Monitoring System]	SIICGE is a control panel showing indicators for monitoring certain institutional management processes with defined goals (Carabineros de Chile, 2017a, p 134) to define progress in relation to established goals in the institution. This platform contains the Victimization predictor that makes it possible to know ahead of time how certain crimes (CMSS) will evolve over the next four months. This predictor, complemented by the PACIC platform, which weekly shows us variation in crime, will tell us if the measures being adopted lead to the expected results in the short and medium term. (Carabineros de Chile, 2018, p. 180).
STOP (Sistema Táctico de Operaciones Policiales) [Tactical Police Operations System]	STOP is an initiative promoted in 2018 that gives continuity to the previous initiatives COMPSTAT, AGEOP and STAD. It is implemented by Law 21,332, enacted in June 2021, which seeks to make transparent and optimize tactical police management oriented to crime prevention through intersectoral statistical analysis of risks and crimes, as well as follow-up on actions that are implemented in the preventive and criminal control areas. Although it is an initiative focused on the development of periodic meetings (at least once a month) at the level of Carabineros de Chile prefectures in which the Ministry of the Interior and Public Safety, the Prosecution Authority and the municipalities of the prefecture participate, it also has a web platform open to citizens on which up-to-date statistics are available for Crimes of Major Social Significance, as well as types of risk (https://stop.carabineros.cl/).
SIMCCAR (Sistema Móvil de Consulta de Carabineros) [Carabineros Mobile Query System] (discontinued; a new similar application is under development at the carabineros)	SIMCCAR is composed of diverse applications and mobile devices that enable the sending, receipt, processing and storage of valuable information for the adoption of a given police procedure, being a constant support in decision-making. Some of the functions that can be used are: Consulting background for the execution of Identity and Vehicular Checks, recording Oversight and Procedures, Background check associated with Security Guards and Safety, Display of positioning of surveillance means in the field stage (Office of the Comptroller, 2019, p. 56). Positioning display is done on the SAIT platform. SIMCCAR was developed by GTD INTESIS S.A. Due to a problem with the procurement, the Carabineros are currently developing their own version of SIMCCAR through a smartphone app.

System Name	Description																																							
SICPOL (Sistema de Consultas Policiales) [Police Query System]	SICPOL is a fixed platform system that enables background checks for individuals and vehicles associated with identity checks and procedures. This system is installed in all operational stations and in the 33 Central Stations for communication nationally (Office of the Comptroller, 2019, p. 56). The system was developed by Ingeniería Solem S.A.																																							
PROSERVIPOL	PROSERVIPOL is an information system that facilitates the registration and storage of the difference police services that units and territorial operative details execute, as well as the allocation of human and logistical resources (Office of the Comptroller, 2019, p. 55). Having all requirements, the resources available to the Unit must be determined, as well information obtained from both the Police Services Programming system (PROSERVIPOL) and that delivered by the Internal non-commissioned officer (Carabineros de Chile, 2018, p. 198).																																							
uve.cálculo (Unidad de Vigilancia Equivalente) [Equivalent Surveillance Unit]	<p>The equivalent surveillance unit (ESU) enables a relation of equivalence between the surveillance capabilities of different devices or media for police surveillance. In other words, how much in terms of prevention and control, for example, does a couple of police officer on foot equal, if we compare it to a radio-patrol with full complement. (Carabineros de Chile, 2018, p. 16).</p> <p>It is calculated based on two methods:</p> <p>Global method: consist of using expert judgment to determine the equivalency relation between the different media for police surveillance. The Prefectures and Commissioners were asked, what was the equivalence between two police devices, according to estimates. (Carabineros de Chile, 2018, p. 16).</p> <p>Equivalency Index: enabled measuring the relative surveillance capacity between the different media, considering two dimensions: quality and coverage, which correspond to the characteristics that define the capacity of the surveillance media to discourage the commission of crimes and to react in light of their occurrence. (Carabinero de Chile, 2018, p. 17).</p> <p>1.00 ESU represents one permanent surveillance unit (24 hours of the day) and in this equivalency process, it is established as a point of comparison to the surveillance that a patrol car with three police officers conducts, being the base Unit in this measurement system (Carabineros de Chile, 2018, p. 18).</p> <table><tr><th>Medio de vigilancia</th><th>Sigla</th><th>Vigilancia (UVE)</th></tr><tr><td>Radiopatrulla con 3 tripulantes</td><td>RPT</td><td>1,0</td></tr><tr><td>Radiopatrulla con 2 tripulantes</td><td>RPD</td><td>0,8</td></tr><tr><td>Furgón Z</td><td>FZ</td><td>1,0</td></tr><tr><td>Moto Todo Terreno</td><td>MTT</td><td>0,45</td></tr><tr><td>Carabinero a pie</td><td>INF</td><td>0,20</td></tr><tr><td>Punto Fijo</td><td>PF</td><td>0,10</td></tr><tr><td>Carabinero Montado</td><td>CM</td><td>0,30</td></tr><tr><td>Carabinero Servicio Tránsito</td><td>CST</td><td>0,15</td></tr><tr><td>Guía con Perro Policial</td><td>GPP</td><td>0,30</td></tr><tr><td>Cuartel Móvil</td><td>CMS</td><td>1,20</td></tr><tr><td>Carabinero en Bicicleta</td><td>CB</td><td>0,30</td></tr><tr><td>Efecto Vigilancia Cuartel Fijo</td><td>EVCF</td><td>0,008 DO (*)</td></tr></table> <p>Nota: (*) DO: Dotación Operativa</p>	Medio de vigilancia	Sigla	Vigilancia (UVE)	Radiopatrulla con 3 tripulantes	RPT	1,0	Radiopatrulla con 2 tripulantes	RPD	0,8	Furgón Z	FZ	1,0	Moto Todo Terreno	MTT	0,45	Carabinero a pie	INF	0,20	Punto Fijo	PF	0,10	Carabinero Montado	CM	0,30	Carabinero Servicio Tránsito	CST	0,15	Guía con Perro Policial	GPP	0,30	Cuartel Móvil	CMS	1,20	Carabinero en Bicicleta	CB	0,30	Efecto Vigilancia Cuartel Fijo	EVCF	0,008 DO (*)
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Punto Fijo	PF	0,10																																						
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Carabinero en Bicicleta	CB	0,30																																						
Efecto Vigilancia Cuartel Fijo	EVCF	0,008 DO (*)																																						


Annex 2: Table of data entered in AUPOL**Figure: Variables to be used in the data entered in AUPOL for CMSS***Source: Author's work based on the Quadrant Plan Operating Manual, Carabineros de Chile, 2018.*

Type of CMSS or criminal	Variables for data to be entered in the AUPOL system
Robbery without violence or intimidation, Robbery with violence or intimidation, Petty theft (Data may correspond to affected parties, witnesses, complainants, detainees, etc.)	Sex: male, female Age Place: supermarket, hospital, collective transport stop, service station, empty lot, commercial establishment, etc. Item taken: jewelry, wallet, money, documents, telephone, etc.
Homicide, Rape, Injuries (Data may correspond to affected parties, witnesses, complainants, detainees, etc.)	Sex: male, female Age Place: supermarket, hospital, collective transport stop, service station, empty lot, commercial establishment, etc. Item taken: jewelry, wallet, money, documents, telephone, etc. Weapon: firearm, knife, sharp object, etc. Aggressor: family member, neighbor, employee, stranger, etc.
Robbery at inhabited location or intended for habitation	Type of building: apartment, house. Inhabitants: indicate the type of inhabitants of the home (elderly, minors, domestic employee, or others). Security: cameras, height of fences or walls, visibility from the inside or outside, porters.
Robbery at uninhabited location	Type of building: company, factory, commercial site, or others. Security: cameras, height of fences or walls, visibility from the inside or outside, porters.
Theft of vehicle or vehicle accessory	Type of vehicle: sedan, 4x4, taxi, etc. Make/Model: according to manufacturer. Item taken: tools, audio, parts, personal articles. Place of theft: supermarket, service station, residence, etc.
Criminal or offender	Sex Age range Physical characteristics Means of displacement Height

Annex 3: Form for data required for entering a complaint into AUPOL

Figure: Required data for entering a complaint into the AUPOL DIGITAL system.

Source: Office of the Comptroller General of the Republic, 2019.

 **CONTRALORÍA GENERAL DE LA REPÚBLICA**
DEPARTAMENTO DE AUDITORÍAS ESPECIALES
UNIDAD DE AUDITORÍA DE SISTEMAS

ANEXO N° 3

Campos obligatorios para el ingreso de una denuncia en el sistema Aupol Digital.

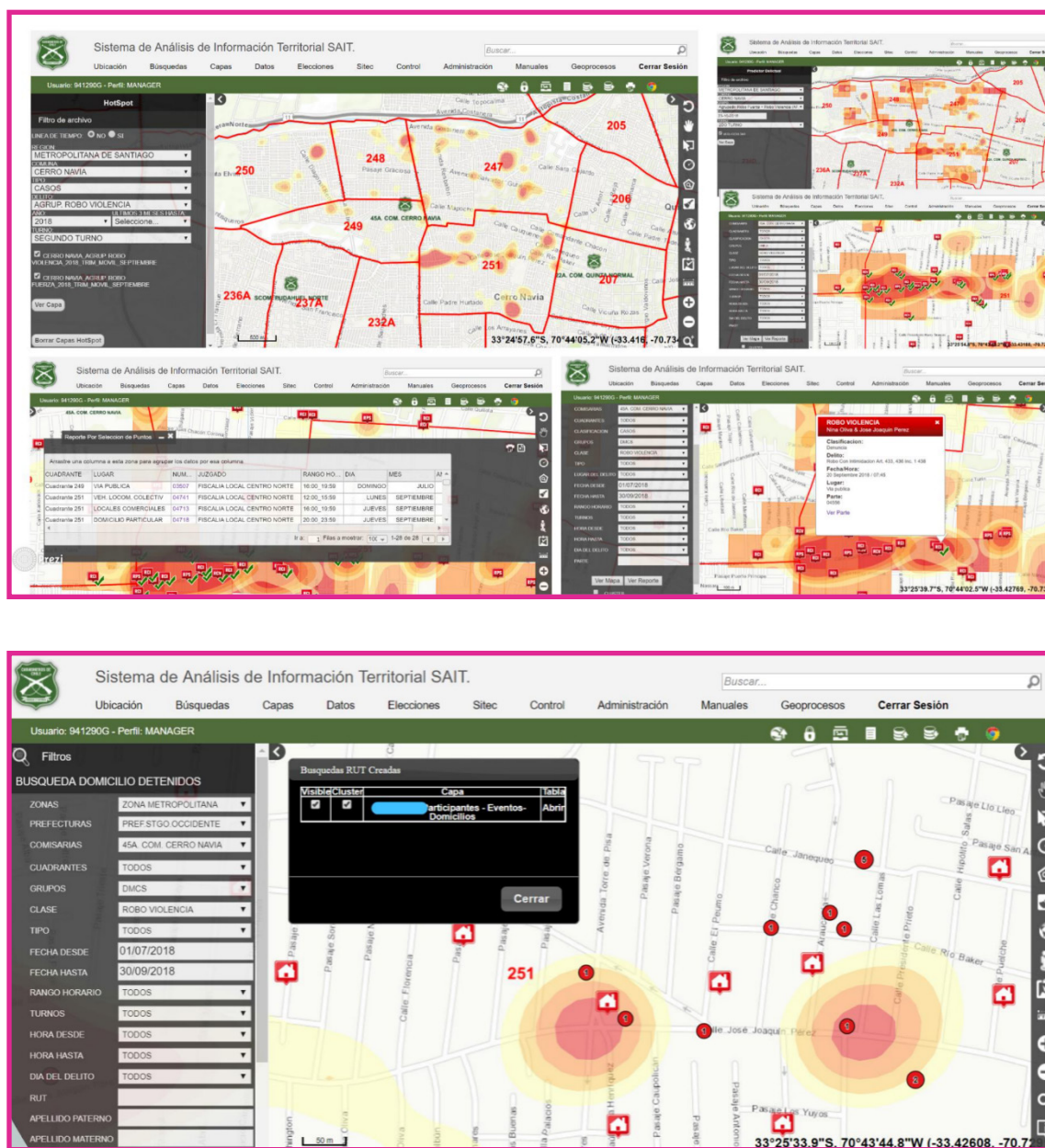
DATOS DE LA DENUNCIA	
Lugar de adopción del procedimiento	
Fecha ocurrencia	
Hora ocurrencia	
Funcionario que adopta el procedimiento	
Delito tipificado	
Tipo lugar	
Región	
Provincia	
Comuna	
Dirección	
DATOS DEL DENUNCIANTE	
Calidad	
RUN	
Apellido Paterno	
Apellido Materno	
Primer Nombre	
Nacionalidad	
Fecha de Nacimiento	
Sexo	
Estudios	
Profesión	
Región	
Provincia	
Comuna	
Dirección	
Narración de los Hechos	

Fuente: De acuerdo a la información solicitada en el formulario de ingreso de nuevos eventos policiales del sistema Aupol Digital.

Annex 4: Information in SAIT 2.0

Figure: Type of information display in the SAIT 2.0 interface

Source: Santos, 2018.



Sistema de Análisis de Información Territorial SAIT.

Ubicación Búsquedas Capas Datos Elecciones Sitec Control Administración Manuales

Usuario: 9412900 - Perfil: MANAGER

HotSpot

Filtro de archivo

AREA DE TIEMPO: ☐ NO ☒ SI

REGION: METROPOLITANA DE SANTIAGO

COMUNA: CERRO NAVIA

CASOS: AGRUP. ROBO VIOLENCIA

FECHA: ULTIMOS 3 MESES HASTA 2018 SEPTIEMBRE

UNIDAD: Seleccione

☒ CERRO NAVIA AGRUP. ROBO VIOLENCIA 2018_TIRIA MOVIL SEPTIEMBRE

Ver Capas

Borrar Capas HotSpot

LEYENDA

Zona de Riesgo

Prezi

Basedatos:

Participantes-EventoDomicilio

Comuna: CERRO NAVIA

Fecha:

Link: [Ver Parte](#) [Ver en Mapa](#) [Ver Evento-Domicilio](#)

Nombre:

Participación: DETENIDO

Tipo: DETENCION

Ubicación: 7342 JOSE JOAQUIN PEREZ

CARABINEROS DE CHILE

PREF. STGO. OCCIDENTE

45A. COM. CERRO NAVIA

PARTE DETENCION

ANTECEDENTES DE LA DETENCION

Región	: REGION METROPOLITANA
Nombre Fiscalía	: FISCALIA LOCAL CENTRO NORTE
Institución Policial	: CARABINEROS DE CHILE
Nro. del Parte	: 03328
Fecha Detención	:
Hora Detención	: 07:49
Unidad Policial	: 45A. COM. CERRO NAVIA
Prefectura	: PREF. STGO. OCCIDENTE

FUNCIONARIO QUE CONFECCIONA EL PARTE

Nombre	: PABLO ESPINOZA FERNANDO ANTONIO
Grado	: SGO. 2DO.
Rut	: 16002335-K

FUNCIONARIO A CARGO PROCEDIMIENTO

Nombre	:
Grado	:
Rut	:

ANTECEDENTES DEL DELITO

Código Delito	: 00803 ROBO CON VIOLENCIA ART. 436
Fecha del Delito	: 438 / 439
Hora del Delito	:
Lugar de Ocurrencia	: VIA PUBLICA
DOMICILIO	
Dirección	: JOSE JOAQUIN PEREZ 7342
Región	: REGION METROPOLITANA
Provincia	: PROV. SANTIAGO
Comuna	: CERRO NAVIA

IDENTIFICACIÓN DETENIDO

Tipo Doc. Identificación	: C. Identidad
Nro. Doc. Identificación	:
Apellido Paterno	:
Apellido Materno	:
Nombres	:
Fecha Nacimiento	: 05-03-1999
Sexo	: MASCULINO
Nacionalidad	: CHILENA

Figure: Situation Card
Source: Carabineros de Chile, 2018.

[illegible]

