«*Predictive Policing in the Belgian Police Service*»

An explorative research report on the interest among Belgian police officers for predictive policing

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Abstract

We are a group of 6 students from societal safety and applied psychology at VIVES University College and during 8 weeks we have conducted research around the theme of predictive policing. Prior to this project, we chose to follow the minor E-society. The minor explored different topics about subjects of emerging technologies and their implications for societies. Given that we are passionate about emerging technologies and policing, we decided to focus on predictive policing. This thesis was not conducted on behalf of an external client, so we conducted it in the name of Vives University College. Throughout our paper, we have used specialised jargon around the topic of predictive policing, and various abbreviations that are represented by an appropriate glossary and a list of abbreviations at the beginning of this paper.

We started our research on the basis of a preliminary investigation that we carried out. Within the police services, we checked whether there were already departments that were working with predictive policing and if there was any room for implementation. We also looked at our neighbouring countries, how they deal with predictive policing. We noticed that predictive policing is not yet widely known in Belgium. Very little research has been done on this topic locally. With this in mind, we wanted to know if the police in Belgium was interested in predictive policing, so we formulated the following research question:

"Is there an interest in predictive analytics among the Belgian Police services, taking into account the legal, ethical, and practical aspects?"

We began our research with the literature review, based on the different parts of our research question. In order to work around the topic of predictive policing, different themes such as the police service itself, practical part, legal and ethical had to be examined. In the first chapter of the literature review, we discuss Belgian police. In the second chapter, we discuss predictive policing followed by the practical part in chapter three. In chapter four and five we discuss the legal and ethical part of predictive policing respectively. In order to make our research known to the public after the literature study, we conducted qualitative and quantitative research on the matter. For the qualitative part, we contacted 30 key figures, of whom we had 12 interviews including a group interview of 4 key figures. Based on our questions formed with the help of our literature study, they were able to give us more information about the theme and state of affairs within police districts. For the quantitative part, we prepared a survey that was distributed among the Belgian police personnel. Our aim was 382 respondents but only managed to gather 73 respondents.

Towards the end of our research, we were able to draw certain conclusions from the results of the qualitative and quantitative research. First, we can conclude that the technological infrastructure is not quite ready to work with predictive policing. Secondly, we can say that the lack of research and concrete positive results are keeping the police from using such systems. Many services are rather waiting for the results on predictive policing systems from other services or countries, before taking action themselves. The next finding is that the legal framework with a small addition specifically for predictive policing is sufficient. Finally, we can conclude that the interest in the use of predictive policing is certainly present within the Belgian police. The conclusions are extensively argued throughout our paper and demonstrated by real-life examples and testimonies of the respondents.

PREDICTIVE POLICING IN THE BELGIAN POLICE SERVICE

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AN EXPLORATIVE RESEARCH REPORT ON THE INTEREST AMONG BELGIAN POLICE OFFICERS FOR PREDICTIVE POLICING

INTRODUCTION

- Being interested in the rapidly changing world, we chose to follow the minor 'E-society' prior to this research. The minor explored different topics about emerging technologies and their implications for societies.
- Given that we are passionate about the subjects of emerging technologies and policing, we decided the subject of predictive policing.

OBJECTIVES

- With our research, we aimed to provide an answer to our central question:

"Is there an interest in predictive analytics among the Belgian Police services, taking into account the legal, ethical, and practical aspects?"

- To formulate an answer to our question, interviewed relevant individuals in different key positions in the Belgian police. Next to interviews we conducted surveys on police employees at all levels of the organisation.

METHODS

Qualitative Research

- Twelve interviews were conducted with sixteen key figures who occupied leadership and policy making positions in the Belgian police services.
- Interviews were semi-structured and were mainly conducted via Microsoft Teams.
- Questions were clustered into different topics to touch on all aspects of the central research question.

Quantitative Research

- Target sample of 382 respondents from the approximately 48.600 police employees with an error margin of 5% and a reliability level of 95%.
- Due to a lack of time, we ended up with 73 respondents, entirely by means of an online survey. Our error margin was recalculated to 11%, our results are not representative with an error margin 89%.

RESULTS

Qualitative Research

- Most respondents agree that the technological infrastructure is not unilaterally ready to support predictive policing on a national scale.
- Respondents want to see concrete results backed up by objective scientific studies before making investments.
- There is no complete legal framework for the use of predictive analytics in policing. Respondents note that relevant laws would need to be supplemented.
- Respondents have a cautionary attitude toward predictive policing as it could lead to various forms of discrimination.

Quantitative Research

- Most respondents are part of the local police. Only 4,1 percent of respondents are part of the federal police.
- Over half of respondents (54.79%) had not heard of predictive policing prior to our survey.

45.21% Yes
54.75% No
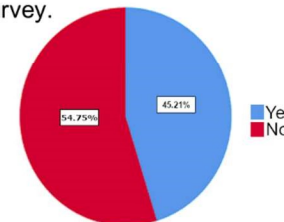
- 82,2% (60) of our respondents see a possible application of predictive policing.
- 65.75% of respondents indicated a willingness to be involved in procedures that rely on predictive policing software.

CONCLUSIONS

we can conclude that:

- The technological infrastructure is not quite ready to work with predictive policing.
- The lack of objective results is keeping the police from investing in such systems.
- The legal framework with a small addition specifically for predictive policing, is sufficient.

ACKNOWLEDGEMENTS

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Acknowledgement

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Our sincere thanks also go to all the respondents who participated in our research. Regarding our qualitative research, we would like to thank all the key figures who on average provided an hour of their time to share their knowledge, vision and opinion with us. For the quantitative research, we would like to thank all the respondents from the different police departments and units, who participated in our survey.

Lastly, we would like to thank the organisation of VIVES. In the midst of the COVID-19 crisis, the organisation did everything they could by arranging weekly opportunities to meet at school. All explanations and expectations were communicated in a timely and clear manner, which made it possible for us to keep an overview of the task at hand, despite the difficult situation.

List of Abbreviations

Abbreviation	Full term
AI	Artificial Intelligence
AIG	General Inspection of Federal and Local Police
ANPR	Automatic Number Plate Recognition
AVL	Automatic Vehicle Location
CADs	Computer-aided Dispatch Systems
CAS	Crime Anticipation System
CAS-map	Crime Anticipation System map
COP	Community Oriented Policing
DSS	Decision Support System
ILP	Intelligence Led Policing
INTERPOL	International Criminal Police Organisation
LAPD	Los Angeles Police Department
MVT	Motor Vehicle Theft
NATO	North Atlantic Treaty Organisation
NYPD	New York Police Department
PDP	Police Districting Problem
Precobs	Pre-crime Observation System
RTM	Risk Terrain Modeling
SaaS	Software as a Service
SSL	Strategic Subject List
UBEV	Unauthorized Breaking and Entering of a Vehicle
UN	United Nations
UNICRI	United Nations Interregional Crime and Justice Research Institute
ASTRID	All-round Semi-cellular Trunking Radio communication system with Integrated Dispatching
FATE	Fairness, Accountability, Transparency, and Explainability

PDF	Portable Document Format
DAS	Domain Awareness System
ADM	Automated Decision Making
HART	Harm Assessment Risk Tool
COC	Supervisory Authority on Police Information
DPO	Data Protection Officer
GDPR	General Data Protection Regulation
LED	Law Enforcement Directive
EU	European Union
ICT	Information and Communications Technology
CCTV	Closes Circuit Television

List of used tables / graphs / figures

Glossary

#	Term	Definition
1	Aggravated assault	an assault that is more serious than a common assault: such as a: an assault combined with an intent to commit a crime. b: any of various assaults so defined by statute. (Merriam-Webster.com Dictionary, n.d.).
2	Aggregation	The collecting of units or parts into a mass or whole (Merriam-Webster.com Dictionary, n.d.).
3	Anglosphere	The countries of the world in which the English language and cultural values predominate (Merriam-Webster.com Dictionary, n.d.).
4	Arbitrary	based on or determined by individual preference or convenience rather than by necessity or the intrinsic nature of something (Merriam-Webster.com Dictionary, n.d.).
5	Big Data	Very large sets of data that are produced by people using the internet, and that can only be stored, understood, and used with the help of special tools and methods (Cambridge University, n.d.).
6	Black Box	A usually complicated electronic device whose internal mechanism is usually hidden from or mysterious to the user (Merriam-Webster.com Dictionary, n.d.).
7	Browser-based	Software that runs on your web browser. It may also be referred to as an app, application, or program. Browser-based applications only require an internet connection and a web browser to function (Warren, 2017).
8	Data mining	The process of using special software to look at large amounts of computer data in order to find out useful information, for example what types of product a company's customers buy (Cambridge University, n.d.).
9	Dataset	A collection of separate sets of information that is treated as a single unit by a computer (Cambridge University, n.d.).
10	Deontology	The theory or study of moral obligation (Merriam-Webster.com Dictionary, n.d.).
11	Digitalization	The process of converting something to digital form (Merriam-Webster.com Dictionary, n.d.).
12	Dignified	Controlled, serious, and calm, and therefore deserving respect (Cambridge University, n.d.).
13	Disentangle	To free from entanglement, to unravel (Merriam-Webster.com Dictionary, n.d.).
14	Felony	A grave crime (such as murder or rape) declared to be a felony by the common law or by statute regardless of the punishment actually imposed (Merriam-Webster.com Dictionary, n.d.).

15	Grand larceny	Larceny of property of a value greater than that fixed as constituting petit larceny (Merriam-Webster.com Dictionary, n.d.).
16	Hurdles	Something that makes an achievement difficult (Merriam-Webster.com Dictionary, n.d.).
17	Jurisdiction	The limits or territory within which authority may be exercised (Merriam-Webster.com Dictionary, n.d.).
18	Larceny	The unlawful taking of personal property with intent to deprive the rightful owner of it permanently (Merriam-Webster.com Dictionary, n.d.).
19	Legislative	a: Having the power or performing the function of legislating. b: belonging to the branch of government that is charged with such powers as making laws, levying and collecting taxes, and making financial appropriations. (Merriam-Webster.com Dictionary, n.d.).
20	Logistic regression	Logistic Regression is a statistical model used to determine if an independent variable has an effect on a binary dependent variable. This means that there are only two potential outcomes given an input. For example, it may be used to determine if an email is spam, or not, using the rate of misspelled words, a common sign of spam (DeepAI, 2020).
21	Misconstrued	To interpret (something, such as a statement or action) wrongly (Merriam-Webster.com Dictionary, n.d.).
22	Pilot program	Activity planned as a test or trial; "they funded a pilot project in six states" (Webster-dictionary.org, n.d.)
23	Platformization	Platformization is defined as the penetration of infrastructures, economic processes and governmental frameworks of digital platforms in different economic sectors and spheres of life, as well as the reorganisation of cultural practices and imaginations around these platforms. (Poell, Nieborg & van Dijck, 2019).
24	Precursor	One that precedes and indicates the approach of another (Merriam-Webster.com Dictionary, n.d.).
25	Predictive analytics	Predictive analytics is a branch of advanced analytics that makes predictions about future outcomes using historical data combined with statistical modeling, data mining techniques and machine learning (IBM, n.d.).
26	Self-fulfilling prophecy	A belief or expectation that helps to bring about its own fulfillment, as, for example, when a person expects nervousness to impair his or her performance in a job interview or when a teacher's preconceptions about a student's ability influence the child's achievement for better or worse (APA Dictionary of Psychology, n.d.)
27	Skewed	Deviating from what is normal, direct, or accurate (Merriam-Webster.com Dictionary, n.d.).

28	Source code	a computer program in its original programming language (such as FORTRAN or C) before translation into object code usually by a compiler (Merriam-Webster.com Dictionary, n.d.).
29	Utopian	Having impossibly ideal conditions especially of social organization (Merriam-Webster.com Dictionary, n.d.).

Introduction

Description of the problem

Context

The world is rapidly changing, the UN predicts that in the year 2050, 9.7 billion people will be walking on Earth. Not only are the demographics changing, but also technology is evolving at an exponentially growing pace. Take for instance the emergence of AI, Quantum computing, drones, blockchain, etc. Furthermore, changes are taking place in the economy due to trade wars and the impact of COVID-19 on businesses. Also, politics and societies, in general, find themselves having to change to keep up with the competition. Next to these changes we also see that our environment is changing (van Rijmenam, 2019). Ecosystems are struggling to keep up with the rapid growth of the human population and everything that is needed to sustain it.

Being interested in the rapidly changing world, we chose to follow the minor 'E-society' prior to this research report. Throughout this minor, we explored different topics of emerging technologies, what they are, the challenges they present, the legal and ethical frameworks, and their influence on societies. After this minor, we had to decide what we wanted to research for our bachelor thesis. Given that we are passionate about the subjects of emerging technologies and policing, we decided to focus on predictive policing.

In our research on the subject, we got the impression that predictive policing is not yet widely known in Belgium. Very little research has been done on the topic locally, the only case of predictive policing we found is that of a scientifically guided test in the police district Zennevallei ('Glazen bol' voor politie Zennevallei? Predictive policing levert nominatie op., 2020). By exploring various sources on the subject of predictive policing, we attempted to gain a better understanding of what predictive policing is and what its implementation can look like in practice. Due to there being so little knowledge around predictive policing in Belgium, we relied mainly on sources from the Netherlands and the Anglosphere[3] countries, which are frontrunners in research on and the implementation of predictive policing systems.

Objective

With our research, we aim to provide an answer to our central question: *Is there an interest in predictive analytics[25] among the Belgian Police services, taking into account the legal, ethical, and practical aspects?* To formulate an answer to our question, we will interview relevant individuals in different key positions within the hierarchical structure of the police. Next to interviewing key figures, we intend to conduct surveys on police employees at all levels of the organisation.

By interviewing key stakeholders, we aim to gain insights into whether the concept of predictive policing could be of interest to the Belgian police force and if there is an interest for it from within the organisation. With our surveys, we aim to describe several characteristics in figures such as '*Percentage of respondents who know about predictive policing*', '*Willingness to work with predictive policing among officers*', etc. For the respondents, we will provide a concise video before the respondents start filling in the surveys that explain the basics of predictive policing. If a police department decides to implement a predictive policing system, our paper might be able to help provide a summary of relevant aspects and considerations on this topic. Furthermore, our paper could serve as a basis for future research on the topic of predictive policing.

Delimitation

Who?

As mentioned above, in order to answer our central research question, we will be focussing on the Belgian police, at both the federal and local levels. Concerning the interviews, we aim to question police personnel who occupy leadership positions within the organisation. The positions we want to interview on the subject of predictive policing are: chief commissioners, first commissioners, commissioners, first chief inspectors, chief inspectors, (health and safety) advisors, policy officiaries, and superintendents. The surveys will be conducted with personnel from all ranks of the organisation, with both civilian and operational members of staff. Although a police board of elected officials is responsible for determining the policies of the local police in Belgium, we have opted not to include these actors in our research. We have come to this decision in the interest of time, as well as due to our central research question which focuses on members of the Belgian police organisation.

How?

We plan on reaching our target audience via two different methods. As mentioned before, we will conduct a series of semi-structured interviews in the form of a predefined extensive questionnaire with police officers in leadership positions. On the other hand, we will conduct surveys with officers from all echelons of the organisation. The interviews will take place online via for instance Microsoft Teams or other similar platforms. We have opted for this method with the currently ongoing COVID-19 pandemic in mind. The surveys will be drafted in Google Forms and distributed to police personnel via email.

What?

Our central research question is as follows: *"Is there an interest among Belgian Police services to use predictive analytics as a tool in policing, taking into account the legal, ethical, and practical aspects?"* After researching the topic, we came to the conclusion that predictive policing is still a new concept in Belgium. Meanwhile, other countries have been working around predictive policing for sometimes over a decade. We needed to know what we were talking about because predictive policing can be understood in a variety of ways, from working with advanced technologies to working simply with police analysts. Because of the minor we followed, we went for the route with the advanced technologies, namely AI for which we gave our own definition for predictive policing in our literature study. This definition will be explained further in the paper.

Timeframe

Our research will take place within the academic year 2020/2021. We were granted eight weeks to work on our project. To efficiently cover as much proverbial ground as possible, we divided assignments among the group members and set ourselves deadlines each week. At the start of the project, we set up a schedule detailing the steps to be taken in order to get an overview of how much time each aspect of the assignment might require.

Research questions

Main research question

We chose to formulate our main research question in this way to enable us to make a broad explorative inquiry into the attitude of the Belgian police with regard to predictive policing. This allows us to gain an understanding of whether or not there is interest from within the organisation to use predictive policing and for which reasons. To be able to acquire a full perspective of the attitude of police officers towards this technology and their reasoning behind it, we included relevant aspects in our question. For this purpose, we opted for the legal, ethical and practical aspects which are tied to the use of predictive policing software. The ultimate goal of our interviews and questionnaires is then to be able to provide an answer to our main research question.

- "Is there an interest among Belgian Police services to use predictive analytics[25] as a tool in policing, taking into account the legal, ethical, and practical aspects?"

Sub-questions

Our sub-questions are meant to help to provide a theoretical framework for our main research question. Each sub- research question aims to substantiate a part of our main research question and give the necessary depth. As mentioned earlier we did not only research relevant literature to attempt to answer our research questions but also conducted a series of interviews and surveys with key stakeholders within the Belgian police. The questions in our interview and survey, which are based on our sub-research questions, are meant to give us a view of the different aspects included in the research questions from the point of view of the Belgian police. Our sub-questions are listed below this text.

- "How does the Belgian police operate?"
- "What is predictive policing?"
- "How can predictive policing be used?"
- "What is the legal framework for the use of predictive data analytics by which the Belgian police services are bound?"
- "What are the ethical implications with regard to predictive analytics in policing?"

Literature study

Chapter I: Police

Integrated police

Since the police reforms of 2001 and 2002, the Belgian police has consisted of two levels, namely the local police and the federal police. Both levels function autonomously from one another and are dependent on separate governing bodies. Despite their autonomous character, there are connective mechanisms which make it possible for both levels to work in an integrated manner. For instance, the deontological[10] code, which is the same for both the local and federal police. Also, basic training is the same for all police officers regardless of whether recruits opt for the federal or local level after their training is completed. In order to seamlessly share information, there is a single general national database to which both federal and local police have access. Lastly, there is the ASTRID digital radio network, used by all emergency services in Belgium to allow better coordination between members of the different services. The Belgian police can be described as a large organisation employing close to 50 000 people, with around 2000 new recruits each year. The roughly fifty thousand employees are divided among 185 local police departments and the different federal directorates (Federale Politie, n.d.).

Local police

Structure

At the local level, the Belgian police is divided into 185 police zones across the entire territory of the country. There are two types of these zones: single municipality zones and multi-municipality zones. As their name suggests, single municipality zones consist of a single municipality. Multi-municipality zones consist of multiple municipalities due to geographical or operational reasons. The largest local police zones employ around 1 500 to 2 800 people, while smaller zones typically employ around 80 people (Duchatelet, 2017).

Every local police zone is led by a chief of police. Single municipality zones are dependent on the municipal council and the mayor for their budget and policies. On the other hand, multi-municipality zones are detached from any single municipal council. Instead, these zones are governed by a police council, which is made up of representatives of their respective municipal councils and its mayors (Lokale Politie Kastze, 2021).

The local police are represented by the Fixed Commission for the Local Police (VLCP). The members of this commission are elected by and from the ranks of the chiefs of police of the local zones. The commission serves as an advisory organ to the different local police zones (Duchatelet, 2017).

Duties

The local police are tasked with seven base functionalities:

- neighbourhood/proximity policing: Police personnel are responsible for certain neighbourhoods or groups within a police zone, where they are frequently in contact with the local population.
- reception: when a person reports to a local commissariat, they are referred to the relevant service within the police.
- intervention: police personnel patrol the area of their police zone and when necessary, they can answer urgent calls. Between interventions these patrols keep watch of high-risk zones or individuals.
- victim treatment: any victim of a punishable offense has a right to sheltering and assistance.
- local criminal investigations: criminal and judiciary investigations within a police zone under the jurisdiction[17] of a magistrate.
- maintaining of public order: the containing of gatherings within the territory of the police zone, such as manifestations, events, markets...
- traffic enforcement: maintaining the safe and orderly conduct of traffic on roads within the territory of the police zone, with exception of the highways for which the federal police is responsible (Lokale Politie Regio Rhode & Schelde, 2021).

Federal police

Structure

Unlike the local police, which is divided into many different police forces, the federal police form a larger single force with roughly 14 300 members of staff. Since 2014 the federal police consist of the general commissioner's office, which consists of the directorate of police strategy, the directorate of international police cooperation, the directorate of communication, the directorate of well-being, and 13 decentralized coordination and support directorates (CSD). Under the general commissioner's office are three general managing boards:

- General Directorate of Administrative Police (DGA)
- General Directorate of Judicial Police (DGJ)
- General Directorate of Resource Management and Information (DGR)

In 2018 Marc De Mesmaecker was elected general commissioner, serving as the head of the general commissioner's office and the federal police in its entirety. The general commissioner is assisted by three commissioners who each serve as head of one of the three managing boards that make up the general commissioner's office.

Duties

The federal police are responsible for a variety of specialized and supportive supralocal policing assignments, which overstep the boundaries of local police zones. The DGA performs specialized, supralocal, law enforcement operations and offers various forms of support to the other federal units and the local police forces. For instance: helicopters, mounted police and dog brigades can be deployed where necessary. The DGJ is tasked with proactively and reactively investigating organised crimes which transcend regional or local police zone borders... These investigations involve human and drug trafficking, criminal organisations and groups, murder, armed robbery, fraud, corruption, forgery and missing persons. The DGR delivers human resources, financial and general management to the police organization. This consists of recruitment, training, staff management, medical, legal affairs, internal affairs, equipment, logistics, infrastructure, finance, etc. (Federale Politie, n.d.)

Chapter II: Predictive Policing

What is predictive policing?

Predictive policing is the central theme of our bachelor's thesis. To better understand this term, a clear definition is therefore crucial. During our research on the subject, we found several definitions from different sources:

- Beth Pearsall (2010) describes predictive policing as "taking data from disparate sources, analysing them and then using results to anticipate, prevent and respond more effectively to future crime."

- Jeffrey Brantingham (2013) describes predictive policing as "a process that uses data to assign explicit probabilities to future criminal events in space and time, presents the probabilities of criminal events in a usable framework to law enforcement decision-makers, and leads to patterns of resource deployment conditioned on crime probabilities. Predictive policing can only be effective if the accuracy of the predictions is evaluated, and law enforcement agencies are prepared to act on probabilistic information."

- Rutger Rienks (2015) describes predictive policing as "The science that uses (computer) models and relevant (police) data to calculate risks in relation to crime. Whereby the aim is to explicitly relate the future to criminal behaviour, or its progenitors based on techniques and models."

We notice that these definitions for predictive policing are quite similar. Basing ourselves on the three similar definitions, we made our own definition for predictive policing:

"A process which uses (computer) models and relevant (police) data from different sources to assign explicit probabilities to future criminal events in space and time in order to provide a more effective and proactive response to future crime."

History of predictive policing

In the 1960s, the system of policing focused primarily on random surveillance and fast response times (Rienks, 2015). In order to surveil the increasing road traffic more efficiently, police departments began to use camera surveillance to assist in the operation of traffic lights by human operators. The technical skills required for such work were not high, but neither was the impact of these surveillance cameras on existing police practices. A discussion around the use of closed-circuit television in the 1960s notes that placing CCTV cameras was relatively easy, the problem was bringing the images into the control room, where senior police officers could view them. In the 1960s and 1970s, technological limitations made any general and total public surveillance unaffordable, mainly because of the high costs of transmitting the images captured by cameras (A. Williams, 2003).

Around the 1980s, the focus in policing shifted to 'community-oriented policing' (COP) (Rienks, 2015), a policing strategy that focuses on developing relationships with community members. It is a style of policing that is highly personalized, in which an officer patrols in the same area for a certain amount of time and develops a partnership with citizens to identify and solve problems within his assigned community (Bureau of Justice Assistance, 1994). In Belgium, COP was implemented much later, at the turn of the century, as a consequence of the police reforms. These reforms were a desperately needed attempt to harmonise the different police services. The police had to be closer to the people, to become more connected with the society they served (Cachet & Prins, 2010).

In the 1990s, a new way of working, named 'hotspot maps' started to be used to represent crime visually across a geographic area. This new way of working was dubbed 'Intelligence-led policing' (ILP): by visualizing crime intensity in geographic areas, police try to more effectively divide their resources and improve their proactive performance. The hotspots were based on hard counts of incidents in the past. For instance, areas are known for the frequent occurrence of gang violence, robberies, etc (Rienks, 2015).

At the start of the 21st century, to be more precise in the year 2008, the term predictive policing was introduced for the first time by police chief William Bratton of the Los Angeles Police Department (LAPD) (Perry, 2013). The LAPD was the first police department to use modern mathematical techniques to model crime and use predictions to target and plan police deployment. Predictive policing is a more recent evolution of the broader proactive policing movement that began in the 1990s as a novel strategy to stem the then-rising crime rates (Weisburd et al., 2019). The theory was that pre-emptive, knowledge-based policing may yield greater gains than what was being achieved by a traditional, reactionary policing style (Bennett Moses and Chan, 2018).

How does predictive policing work?

Algorithmic data analysis

The rapid development of technology makes it possible to make predictions based upon the statistical analysis of data by computer algorithms. Russel and Norvig (2014) describe an algorithm as: "A sequence of instructions established to solve a particular task, and an automated one is capable of being implemented by a machine, usually a digital computer". Algorithms can be used in various forms of technology that autonomously without human intervention- solve problems which would otherwise require human intelligence. These technologies can be labelled as artificial intelligence (AI). Walsh et al. (2019) define AI as: "A generic term that covers a variety of related computational techniques such as machine learning, speech recognition, machine vision, natural language processing, expert systems and various tools for planning and optimisation, used for problem-solving and performance of tasks that normally require human intelligence". It is however also worth noting that there is no consensus among researchers of what AI is and is not. As a result, there is no universal definition of artificial intelligence.

Just like other forms of data, criminal behavioural data can be analysed by computer-driven algorithms, however, to do this you need vast amounts of data, commonly referred to as 'Big Data[5]'. Big Data[5] is a large volume of information that grows exponentially with time through the constant gathering of new data. Because there is so much data and it is often very complex, no traditional data management tools and methods can store or process it efficiently (*What is BIG DATA? Introduction, Types, Characteristics, Example, 2021*). Using present-day technology, such as AI, large amounts of data can be processed and valuable information can be extracted from it, more quickly and efficiently than ever before. Although artificial intelligence is a very potent tool when large amounts of information need to be processed in a short amount of time, the output of these systems is only as good as the data which is put in. In computing, this is referred to as: 'garbage in garbage out'. When basing an analysis on unreliable, falsified, incomplete or biased data the results will not be accurate or useful (American Psychological Association, n.d.). Artificial intelligence is fuelled data, which means that there are significant legal challenges for law enforcement. If these challenges are not addressed and overcome, the use of AI in policing could infringe fundamental human rights. The two legal instruments which come up most often in discussions on the topic of AI in law enforcement are the EU's General Data Protection Regulation (GDPR) and its Law Enforcement Directive (LED). These legal instruments will be discussed in more depth in the Legal chapter.
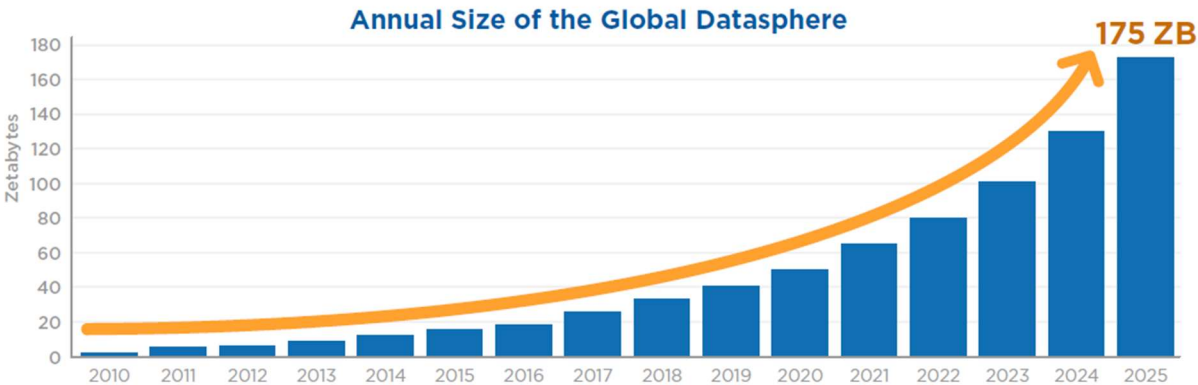

Figure 1 Annual size of the global datasphere
(Source: Annual size of global data and its forecast of the future, source: IDC DataAge 2025 whitepaper)

Over the years, several INTERPOL-UNICRI reports were produced, providing insights on AI in association with law enforcement. The first report on AI broadly clarified the legal and ethical perspectives of law enforcement's use of AI and identified the need for law enforcement to ensure the responsible use of Artificial Intelligence. It is helpful to clarify the term "responsible" from the outset to avoid ambiguous interpretations. The 2019 paper AI and ethics in policing from Leiden University suggests that acting responsibly from a legal perspective means accepting moral integrity and authenticity aside and making a reasonable effort to achieve them. The pursuit of moral integrity, in turn, implies "subscribing to the values of freedom, equality, and solidarity" (AI report INTERPOL UNICRI).

In this context, the responsible use of AI by law enforcement must be understood as use that adheres to the general principles of respect for human rights, democracy, justice, and the rule of law to achieve these principles, law enforcement must ensure that the design and use of AI meets the requirements of fairness, accountability, transparency, and explainability (FATE). These requirements have emerged in recent years from a consensus within the AI community about what algorithms need to ensure appropriate levels of security. In the chapter ethical we will provide a more in-depth explanation of each requirement.

Different types of predictive policing

There are three different types of predictive policing: forecasting hotspots, predicting who is most likely to be a perpetrator, and predicting who is most likely to be a victim. In its essence, predictive policing is not about making crime-related predictions. Rather it serves as a prediction led policing process consisting of a cycle of decision points and activities. At each stage of this cycle, police must make choices regarding: what sort of data they want to collect, how often and for how long of data should be collected and updated, which sorts of analytical tools to use, which variables to focus on, which sorts of police operations they want to deploy, how to evaluate interventions and when, as well as which changes should be made to interventions after evaluation (Moses and Chan, 2016). To put it shortly, predictive policing is a tool that can assist police in determining where and when they can deploy resources and personnel to proactively combat various forms of crime which are likely to occur at a certain time in a certain location or be perpetrated by or against certain individuals and groups. Predictive policing does not predict isolated cases of crime, only places and timeframes within which crimes may occur as well as who is most likely to be the perpetrator and victim.

Hotspot forecasting

Hotspot policing is a strategy that entails the targeting of resources and activities to those places where crime is most concentrated. The strategy is based on the principle that criminal activity and disorder is not spread over the same range within neighbourhoods but is instead clustered in relatively small locations. By focusing resources in hot spots, authorities aim to prevent crime in those specific locations and potentially, reduce the overall crime levels in the area of the disturbance. Hot spot policing is not defined by the use of specific interventions or tactics. These variables may change depending on the sort of criminal activity in the targeted high crime locations. Tactics and interventions could include increased police patrols and law enforcement or problem solving (McDaniel, Pease, 2021). In hotspot forecasting, predictions are visually shown on a geographic map of a certain area, such as a city. The geographic map is divided into a grid-like structure of, for example, 150 square meters. Probabilities can be calculated separately for the different squares within the grid about the occurrence of an incident in the future. For each square, a risk-score is assigned. These scores are being used to create heat maps, much like the hotspot maps used in the 1990s. The squares with a higher risk-score get a warmer colour, for instance, red, while the lower one gets a colder one, for example, green. Using this visual map, police units can be deployed more effectively by making the best use of resources, increasing chances to catch criminals red-handed, proactively fighting crime, etc (Rienks, 2015). As mentioned earlier, the AI at the

base of these systems is fuelled by data. Feeding solid data into the system is thus essential to obtain accurate and useful predictions. Even if police make a precise decision about the location of a crime, once officers arrive, they still need to identify potential offenders (Mohler, 2014). Singling out, stopping, questioning, and possibly frisking law-abiding individuals not only harm those individuals but also produce long lasting social costs. For example, the undermining of trust and the loss of confidence in the police's ability to do their job (Manski and Nagin, 2017). An example of a hotspot prediction system is the crime anticipation system (CAS) used by the Dutch police. This example, among others, will be explored in more depth in the practical chapter.

Perpetrator prediction

In perpetrator, prediction data is analysed to attempt to make predictions of which individuals are the most likely to perpetrate certain forms of crime. Using artificial intelligence to identify risky individuals is seen as justified by some because it is estimated that, generally speaking, six percent of the population commit sixty percent of crimes (Ratcliffe and Kikuchi, 2019). Often people develop routines in their daily activities. For some individuals, criminal behaviour may simply become a part of their daily routines (Perry et al., 2013). The ability to isolate the riskiest individuals and focus resources on them serves to effectively protect the public from future harms. The potential value here is not only in protecting the public by preventing crimes from taking place. Risk assessment tools can also be useful for the safety of police officers. For instance, tools that are specifically designed to predict the threat of gang members or of domestic violence perpetrators could inform officers on the importance of greater precaution than they may otherwise take when responding to calls for assistance involving specific known suspects. In perpetrator prediction, law enforcement agencies have opted most often to target violent offenders because of the disproportionate harm they cause to victims and communities. Although this particular form of predictive policing has many promising benefits, several concerns have been raised. A risk assessment program, which scores people from lesser to higher risk, may lead police officers to behave more aggressively with individuals identified as high risk (Ferguson, 2017). A high-risk attribution can potentially act as a status offence, in which the person is punished for their high-risk status instead of any specific action. For that reason, the designation of high risk can be stigmatizing to individuals and can result in a self-fulfilling prophecy[26] in which they then also act more aggressively (Meijer and Wessels, 2019). Examples of perpetrator prediction-based systems, which will be touched upon further on, are the Chicago police strategic subject list (SSL) used in the United States or the Gang Violence Matrix used by the London Metropolitan Police.

Victim prediction

Victim prediction pertains to the process of trying to predict which groups, individuals or areas are most likely to fall victim to criminal activity. Similar to the other forms of predictive policing, historic crime data is processed by AI algorithms in order to mark 'hot people' or places. Opposed to perpetrator prediction, hot people or hot places in this context refers to people or places which are most likely to be the victim of crime, rather than being a perpetrator. A well-known phenomenon for which victim prediction can be useful is repeat or near-repeat crimes. Near-repeat or repeat crimes are processes whereby additional crimes are more likely to occur near or in the same area of an original crime. Often crimes such as: burglary, robbery, weapons violations, among others adhere to this principle (Police foundation, 2018). It is assumed that within 72 hours of a crime, there will be a repeat within a certain zone. The risk is however also temporary, allowing police to patrol an area or safeguard persons so long as they are at a heightened risk of being victimized. This manner of proactive policing can however also entail certain risks regarding the relation with the public. How police approach and interact with citizens may have important consequences for citizen evaluations of whether they were treated in a fair and dignified[12] way and, in a more general sense, for their trust in the police. These perceptions could in turn have behavioural consequences. For example, the willingness of citizens to comply with requests or orders

from officers. Take for instance a neighbourhood that is known to have a larger amount of gang violence victims and perpetrators. If police approach every citizen in such a neighbourhood as a potentially violent criminal this could have an adverse effect on the willingness of law-abiding citizens to cooperate with the police (National Academies of Sciences, Engineering, and Medicine et al., 2018). An example of victim prediction is the German developed pre-crime observation system (PRECOBS). PRECOBS will be explored in more depth in the practical chapter.

Chapter III: Practical

Introduction

In the previous chapter, we covered the definition and the history of predictive policing. In the following chapter, we are going to address the practical aspects of predictive policing and the various use cases that this technology could have. Within this chapter, we will try to formulate an answer to the question: 'How can predictive policing be used?'.

In a report published by INTERPOL, it's stated that many law enforcement agencies have an increased interest in AI-based technologies. This statement is formed on the expanding cases of AI being adopted in national strategies, action plans, or other associated policy papers. This also resulted in heightened interest and understanding of how AI-based technologies could be integrated into their work field. Although the majority of use cases are mainly pilot programmes[22] that focus on the different techniques and possible approaches, the application of such tools in the future by law enforcement is becoming very probable.As already mentioned in the introduction, our world is rapidly changing and technology has a big role in doing so. Although law enforcement is showing more interest in the digitalization[11] of their work field it is far from what it should be and that gives criminals the chance to adopt the different emerging technologies in their favour (Mali, 2020).

In (Mcdaniel & Pease, 2021), the three different types of predictive policing are explained e.g. hotspot forecasting, perpetrator prediction, and victim prediction.

INTERPOL's report (2020) revealed the five main areas with regards to the implementation of AI in the context of law enforcement.

1. **Hot spot mapping:** This approach is based on the collection of historic crime data from the local law enforcement departments. The crime data could be combined with other datasets[9] such as police patrol history, criminal knowledge, and also insights about the weather predictions. All this information is then used to create crime hot spots in the given jurisdiction[17].
2. **Deployment of resources on demand**: Once the hot spots in a certain area are identified, the AI could be used to distribute the police department's resources. The distribution is based on the demand in the area and it could include personnel, vehicles, and equipment.
3. **Patrol route scheduling:** The already mentioned hot spots could also be used to optimize police officer's patrol routes and schedules.
4. **Dispatch of resources for calls:** This entails the disposal of the nearest available units to respond to service calls.
5. **Response route plotting:** This could be used for identifying the optimal patrol route for police officers and the possible deployment of their available resources taking into account the optimal response time.

In this chapter, we will shift our focus to the practical side of predictive policing software, also the shortcomings of predictive policing will be addressed. Those who are familiar with the concept of predictive policing know that it is not a utopian[29] technology that in all situations will make the right predictions. Although this thesis is centred around the possible use case of predictive policing by the Belgian police, we want to be as objective as possible and to showcase the potential added value but also the uncertainty of this technology.

Predictive policing software

The rapidly changing environment that we're living in and the ongoing digitalization[11] of our society almost urges law enforcement to shift toward proactive forms of crime control or crime prevention. For this reason, predictive policing is seen as an innovative tool that can revolutionize law enforcement. The truth is predictive policing should be seen as an evolution in crime prevention and control, and not as a revolution. Developments in data mining[8], predictive analytics[25], hardware for the algorithmic-driven analysis of large data sets, and the drop in the financial cost of data storage make utilizing predictive policing increasingly irresistible (Egbert, 2019).

Utilizing predictive policing software can make a significant difference in the effectiveness and efficiency of a police department. By intervening in an early stage of a criminal process, police forces can improve their performance in fighting crime (Rienks & Tuin, 2011).

Hardyns & Rummens (2017) mention that predictive policing can be used for any crime, but there are two factors that need to be in place in order to be able to make crime predictions. Firstly, they mentioned the importance of knowing about the strong indicators for the risk of a crime event. The second important factor is that the data about those indicators can be collected beforehand. The authors also mentioned that property crimes such as home theft, burglary, and mugging where the victim and the perpetrator are strangers to each other are the most suitable to make predictions about. Different studies show that predictive policing is less effective with crimes where the perpetrator and the victim are related for example in cases of relational violence and also in drug crimes (Bachner 2013, Hollywood et al. 2012, Perry et al. 2013, in Hardyns & Rummens, 2017).

In the previous chapter, we mentioned the importance of data. To be able to make crime predictions, it is important to distinguish which variables to use in the forecasting process. Although we can use different variables, the three essentials are *time, place, and type of crime*. In addition to those three variables, oftentimes other relevant indicators can be determined based on existing literature, and data, such as:

- Crime history variables: number of crimes in a certain period of time, area, etc.
- Time-dependent variables: occurrence of crime during specific events, seasons, holidays, weather conditions, etc.
- Opportunity variables: the presence of particular infrastructure such as bars, highways or intersections, shops, etc.
- Precursor[24] crimes: previous crime events, heightened risk of unnecessary violence, etc.

The concept of 'machine learning' has already been mentioned in the chapters before but we did not cover the essence of it. According to the online dictionary (www.dictionary.com) the definition for machine learning entails the following *"The capacity of a computer to process and evaluate data beyond programmed algorithms, through contextualized inference".* Haykin (2009, in Hardyns & Rummens, 2017) stated that machine learning models are defined by their higher predictive power and performance with the processing of complex data.

Neural network(s) is another concept that was previously mentioned and referred to as a 'black box[6]'. This is also the best-known machine learning model. This model is set to recognize patterns and self-correct in repetitive cycles based on the pre-existing data about a given variable. Furthermore, not only machine learning models can be implemented in predictive police but also statistical models. The latter differentiate into two models: near-repeat models and time-space models. The first model is based on home burglaries and the higher chance of near-repeat repeat victimization following the initial crime. The advantage of this model is the fact that it does not need a lot of information apart from data about the time, place, and type of crime. But this can also be seen as one of their main disadvantages, as the near-repeat model isn't very adaptable with the integration of other available data. This is not the case with time-space models as one of their advantages lies in the possibility to integrate data/variables from different sources.

As already mentioned, 'predictive policing' could have various practical uses. This is because there are several forms of predictive policing software. Today we differentiate four distinct predictive policing software: Geolitica (PredPol), PreCobs, CAS, & ShotSpotter (Hunchlab). Although these all share the same main goal of making plausible predictions about when and where a crime could occur and rely on pre-existing data in order to do so, they also differ from one another and have various use cases. In the texts below we will address how the four different software packages work and which variables they use in order to deliver their promised results (Mali, 2020).

We mentioned the importance of being objective about predictive policing software. The technology has a lot of potential, but this potential has to be utilized. Like the various potential benefits, there can also be various potential shortcomings to predictive policing. There are a lot of variables that can influence the decision-making of the system. Therein lie some issues such as the possible negative or even discriminatory effect that the predictions could have on minority communities and the so-called 'self-fulfilling prophecy[26]'.

The possible discriminatory effect is described by Degeling & Berendt (2018) as they stated the following:

"Predictive policing algorithms are neither objective nor immune to bias, as all algorithms use some form of inductive bias." (Degeling & Berendt, 2018)

This statement should already raise some questions about the possible ethical issues of the system. As the predictions that the software makes are based on pre-existing data, O'Donnell (2019) mentioned the existing biases in the available crime data. Any form of biases in the crime data could have serious consequences to the output of the predictive policing algorithms and software. The biased inputs could lead to biased outputs in the form of predictions that are based on pre-existing beliefs and conclusions.

Sheehey (2019) described one of the possible consequences of biased input that goes into the algorithms could lead to the concept of 'self-fulfilling prophecy[26]'. This concept could be harmful to minority groups, as in larger cities they are most likely to get a higher risk score, as they more frequently come in contact with the police. This could also lead to the over-policing of some areas where law enforcement already has a presence.

The over-policing of those areas could be seen as a vicious circle, where a certain group is targeted. A more known term for this method is "racial profiling" or "ethnic profiling", which oftentimes involves the discrimination of a minority group based on their ethnicity, religion or nationality (Wikipedia, 2021).

Therefore, the importance of correct data cannot be underestimated as it could also raise some ethical concerns about the use of predictive policing (Browning & Arrigo, 2021). Further in the text, we will address the possible ethical implications with regards to predictive policing.

The fact that predictive policing is not being implemented in the Belgian police does not necessarily need to give us the indication that this will not ever be the case. In fact, the police departments could use the time to better understand how, if at all, they could utilize this type of technology and even plan ahead with a possible continuation of such an approach. A possible continuation of predictive policing is the so-called "prescriptive policing" and will be addressed in the text below.

Over the last decade of 'Big Data[5]', organisations have sought to exploit the large volumes of mixed format data that flow with high rates of change. A number of analytics techniques have developed including: (a) descriptive analytics to gain insight into and extract meaning from the past, using e.g. data aggregation[2] and data mining[8]; (b) predictive analytics to understand the future, using statistical and forecasts approach; and (c) prescriptive analytics to provide advice on possible actions and outcome, using simulation and optimization approaches (Schlehahn et al., 2015). Prescriptive policing is one of the possible future applications within law enforcement and is seen as the next step after predictive policing. This way of policing described by Smit, De Vries, Van der Kleij, and Van Vliet (2016) is that this approach is able to predict the effectiveness of the deployment of particular police resources in specific interventions. So, in other words, prescriptive policing is based on pre-existing data about the effectiveness of police resources deployed in specific interventions.
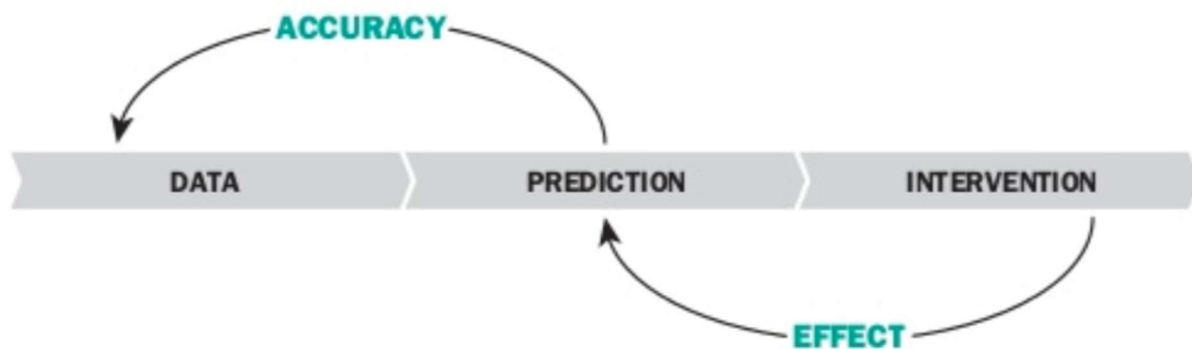
Figure 2: Predictive and Prescriptive policing
(Source: From Predictive Policing to Prescriptive Policing)

In the paper written by Smit, De Vries, Van der Kleij, and Van Vliet (2016) it is mentioned that the two systems e.g. predictive and prescriptive policing are both important for the chain that is illustrated above. The authors of the paper also mention that although the two approaches are interdependent, they both could be developed independently.

Prescriptive policing is most effective when it is focused on a specific area. Although it is also possible to anticipate the effectiveness of the interventions by the police, by basing their decisions on the effects their interventions had in other areas. The relevance of the available data and characteristics of the area and the intervention are here utterly important. Police officers could make a generalized assumption about which type of intervention could be more effective in particular cases and which not, instead of focusing on one particular area or district.

To give some insight into the approach of prescriptive policing, in Smit, De Vries, Van der Kleij, and Van Vliet (2016) an example is given about the effectiveness of patrolling. The authors mention that a patrol by car in a certain area could be less effective in comparison to a patrol on a bicycle in this same area.

Prescriptive policing gives officers the possibility to put their knowledge and years of experience into practice in interventions. The context of the interventions has a crucial role as if the context in two separate interventions is similar or the same then the same approach to the situation could be made.

As is the case with predictive policing, also in prescriptive policing the human factor has an important role. Just because the system made a suggestion about a certain action it should not dictate that this particular action should be executed. The officers and other involved parties should be critical about the suggestion of the system and base their decisions on their experience and knowledge, as they are the key actors in prescriptive and also predictive policing. Blindly trusting the prediction of the system could lead to ineffectiveness and predictability of police officer's interventions particularly if they have been used before.

In the texts below we will mention the different types of predictive policing software. We will also try to give clarification about the effectiveness of these software. Further, we will address the different use cases of AI & algorithms within law enforcement and also the possible complications that may come with it.

Different predictive policing software

PredPol (Geolitica)

PredPol is the first predictive policing software that has been developed. In the first quarter of 2021, PredPol announced that they are changing their name to Geolitica. The company shared that the reason for the change was mainly due to the fact that the new name better represented the direction that they have taken in the last few years. Throughout this text, we refer both to Geolitica and PredPol at the same time, as most of our sources date a few years prior to the name change that we mentioned above.

According to Wikipedia, as of 2020 PredPol's algorithms are the most commonly used predictive policing algorithms in the United States (www.wikipedia.org). These algorithms are based upon three different aspects: repeat victimization, near-repeat victimization, and local search.

The first aspect of the algorithm 'repeat victimization' relates to the known phenomenon that locations, where certain crime occurs, are more likely to attract more offenders or the initial offenders could return to the crime scene and again commit a crime.

The second aspect 'near-repeat victimization' recognizes a greater risk for a victim to get victimized again but also for individuals or areas nearby.

The last aspect 'local search' pertains to the distance that an offender covers to commit a crime. In most cases, offenders commit crimes in their immediate surroundings and rarely travel far from their key activity points such as their home, work, etc. This information was obtained from PredPol's website (www.predpol.com).

PredPol also has a special way of working as it uses an earthquake prediction model to forecast crime. Although this approach is criticized in an article that was published by VICE where academics labelled it as "simplistic and harmful" (Haskins, 2019).

PredPol's approach is based on the occurrence of earthquake aftershocks, it can be compared to some crime scenes, where the so-called 'aftershocks' occur nearby in space and time after the initial crime took place. This can also be linked with the manifestation of the above-mentioned 'near-repeat

victimization' as the near area of the initial crime scene could temporarily have heightened the possibility of crime occurrences (Mohler et al. 2011, in Moses & Chan, 2016).

According to their renewed website with their new name (www.geolitica.com), Geolitica (PredPol) operates a cloud-based, software-as-a-service (SaaS). This means that their software can be licensed on a subscription basis (www.wikipedia.org). This software can provide police officers with patrol guidance and can measure their performance in real-time. They also use computer-aided dispatch systems (CADs) in order to prepare and deliver missions to the police officers and provide them with patrol recommendations.

On every internet-connected device, patrol guidance can be delivered. They operate on a Google Maps interface where the patrol routes/locations are displayed in red 152,4x152,4 meter-boxes. Geolitica (PredPol) shares that they can also deliver their guidance through other mapping platforms such as ESRI. They also use automatic vehicle location (AVL) in order to monitor and measure officer's real-time and historical performance during their shift. All the data and analytics that the software generates are available through different accountability and transparency reports.
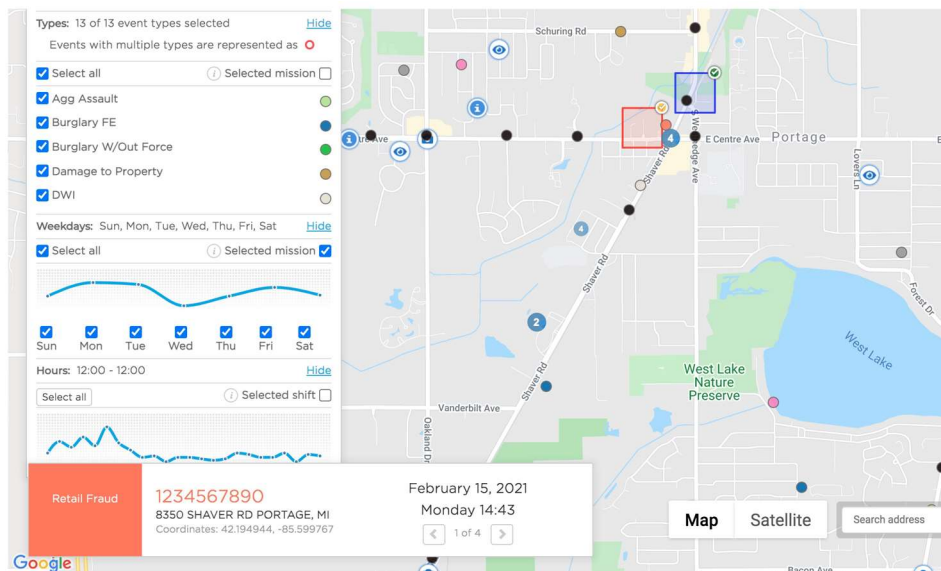
Figure 3: Geolitica (PredPol) in practice
(Source: https://geolitica.com/technology/)

Those transparency reports are mainly focused on increasing the transparency, accountability, and effectiveness of the software while being used. On their website, Geolitica gave some examples of what the transparency reports contain. According to them, the reports contain the following information: patrol heatmap (shows the time spent patrolling in certain areas), officer reports (the movement of officers during their shift), resource hotspot analysis (identify areas with high amounts of officer time), and mission reports (possible to show the broad audience on which crime types the officers are focussing).

Their software uses machine learning (AI) to create risk assessment maps that are based on pre-existing and also on current data. As already mentioned in the section above, PredPol (Geolitica) operates on a Google Maps interface in order to identify the higher risk locations for specific crime types for each shift. The goal is for police officers to proactively patrol high-risk locations and prevent crime from occurring. According to the police officers, crimes often occur because of a lack of police presence, and patrolling in higher-risk locations, will afford a higher chance of preventing crime from happening.

In order to achieve their goal of preventing crime from happening, Geolitica uses 3 data points that are shared by the victims and reported by the police: *crime type, crime location, crime date and time*. As we can see, no arrest data is used due to philosophical and practical reasons. The philosophical reason is that they want to protect the privacy and the civil rights of the people and communities they serve. Therefore, they don't collect any personally identifiable information (racial, economic, demographic) in their model. The practical reason to only use the 3 data points mentioned above lies in the fact that they provide the most accurate forecasts. For them, this is also the most objective data available as across the different police departments they use the what-where-when method of crime reporting (PredPol, n.d.).

Use case

In a white paper that was published by PredPol (Geolitica) (n.d.), the company shared some insights about how they operate and showcased a study about the results of their software in practice. The first part of the paper focuses on a study of the use case of their software in a Southeastern city located in the United States which has a population of about 300,000 inhabitants. The main goal of this study was to find out if the investment in PredPol's software is justified. To do so, PredPol (Geolitica) used criminal data from June 2019 to February 2020 and compared that data with the data from the previous year throughout the same period when the city did not use PredPol's policing software (June 2018 to February 2019).

In the table below, we can see that Southeastern city had a significant drop in the named crimes. It is important to notice that in its first year of deployment the agency focused on two types of crimes: personal crimes (robbery and aggravated assault[1]) and property crimes (burglary, vehicle theft, and vehicle break-ins). To tackle these crimes, PredPol absorbed several years of historical data about the five listed crimes. This makes it possible for the predictive model to be trained through machine learning. PredPol (Geolitica) also shares that their software can get daily updates of new crimes and this way they can be added to the self-learning model.

Crime	June 2019 to Feb 2020	June 2018 to Feb 2019	Crime reduction	Percent Reduction
Robbery	508	904	396	-44%
Aggr assault	952	1243	291	-23%
Burglary	1746	2171	425	-20%
MVT	1558	1617	59	-4%
UBEV	1835	2161	326	-15%

Figure 4 Geolitica's (PredPol) effectiveness
(Source: Calculating the return investment for medium-sized city using PredPol)

The use of PredPol's (Geolitica's) software also led to a reduction of the time that officers spent investigating the crimes listed above. To calculate how many hours the officers saved, they used a source of documentation that indicated a range of how many hours the officers spent on these types of cases.

In this same white paper, it is mentioned that for all cases, the lowest range of hours was used which officers usually spent on these kinds of cases. Then the hours were multiplied with the crime reduction figures. This led to the estimated result that the Southeastern police department, in a timespan of 9-months, saved about 37,253 hours that would have been spent on investigations. Next to cutting a large number of work hours, police were also able to cut back on resources they would usually need for investigations that span the same amount of time.

Geolitica based their calculations on hourly rates for patrol officers and investigative officers, obtained from the website salary.com. The total savings the police department was able to make, in terms of officer's salaries, were equivalent to $1,736,479. The amount which they spent on a PredPol subscription for one year was just under $60,000. This leaves the police department with a return on their initial investment of 2900%.

We would like to point out that such returns on the initial investment of 2900% are not representative. The majority of the police departments would probably have a much lower return percentage and also a lower percentage in the reduction of crime. The information about the Southeastern city located in the United States is an example of a 'success story' and could be very hard to replicate. Meijer & Wessels (2019) and other authors emphasize the importance of strategies with regard to predictive algorithms. If not executed properly, could lead to reduced effectiveness of the predictive algorithms.

PreCobs

Precobs is an acronym for Pre-Crime Observation System. It is a German predictive policing software that uses algorithms in order to predict the so-called "near-repeat"-crimes. To do so they make use of past crime data. This particular predictive policing software package is developed and sold by the Institute for pattern-based Prediction Technique in Oberhausen.

The use of Precobs is mainly targeted towards crimes that are committed multiple times within a close geographical and temporal context. Near-repeat crimes oftentimes occur within seventy-two hours of the initial crime. The most common types of crime are burglaries, street robbery, armed robbery, and motor vehicle theft (www.wikipedia.org).

PreCobs focuses mainly on cases of home burglaries and is introduced in several German cities (München, Nürnberg, Stuttgart, and Karlsruhe) and also in Switzerland (Zürich, Basel, and Aargau). As it is a commercial software package, it can be easily utilized in police departments. As already mentioned, PreCobs analyzes past crime data in relation to "near-repeat" crimes (IfmPt, n.d., in Hardyns & Rummens, 2017). The outputs of those analyses are forecasted on a map with colour-coded cells and each cell has a surface of 250 by 250 m (Rest, 2014 in Hardyns & Rummens, 2017).
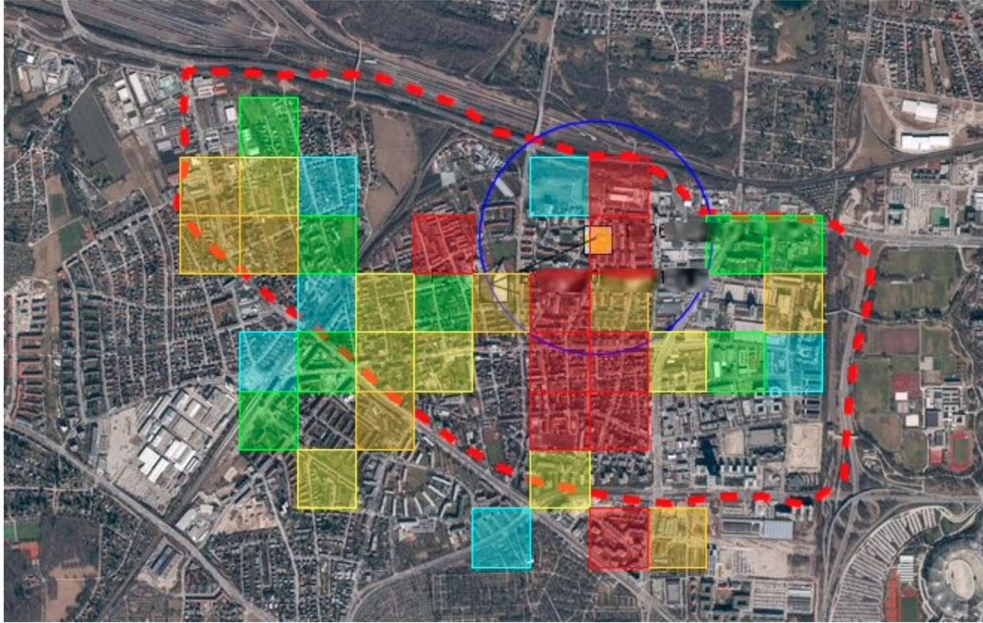
Figure 5 PreCobs in practice
(Source: https://land-der-ideen.de/en/project/precobs-software-for-predicting-crimes-355)

In order to make the assumption about the heightened chance of "near-repeat crimes" the police doesn't explicitly need software, but the use of an analytic system(s) such as PreCobs can be beneficial to make more plausible predictions.

In an article, Simon Egbert (2019) described the potential of predictive policing and mentioned the platformization[23] of police work. The latter is seen as an organizational process in which different police data sets, databanks, and external sources are cross-linked. The main goal is to create a better information network that is designed to improve police work on different levels by acquiring new knowledge. This can result in different ways of police work e.g., patrol allocation, police management, crime investigation, etc. (Wilson forthcoming; Linder forthcoming In Egbert, 2019)

According to Wilson (forthcoming, 2018a: 123 & 2018b In Egbert, 2019) this new trend of "platform policing" is also manifesting in Germany with the crime prediction software Precobs through a relaunched version of their software named Precobs Enterprise. The relaunch was due to limitations in the original version of the software. It was theory-centred, centrally controlled, and made predictions based on the near-repeat hypotheses. The new version, on the other hand, is more open to different theories which are translatable into classification and evaluation algorithms for future crime risks.

Middendorf and Schweer (2018, In Egbert, 2019) describe Precobs Enterprise as having an expanded spectrum of predictable offences and moving towards a general risk approach or Risk Terrain Modeling.The concept of Risk Terrain Modeling (RTM) is often described as a "Systematic plan of action for studying spatial vulnerability to crime" but in fact, this type of modelling can have different use cases such as injury prevention, public health, traffic accidents, homeland security, etc (Caplan, Kennedy, 2016).

The authors of the book "Risk Terrain Modeling: Crime Prediction and Risk Reduction" (2016) stated that RTM entails three key processes. In the text below the three processes are briefly touched.

1. **Standardizing disparate datasets[9] to a common geography:** A cartographic process of operationalizing qualities of a landscape to geographic maps that represents the spatial influences of environmental factors across different areas.
2. **Diagnosing spatial risk factors:** Based on a statistically informed process it is possible to identify the crucial factors that geographically relate to crime incidents.
3. **Articulating spatial vulnerabilities:** The two processes above are combined in order to generate data about the spatial context for a crime.

The vulnerable places can be communicated in a coherent way by means of statistics in which the locations where the likelihood of criminal behaviour will be high can be visualized.

Returning to PreCobs, it is also noted that the relaunched version of the software is applicable for the use of police-related data analysis and that those analyses are not only fixated on making predictions. The software also serves to support the police in solving crimes by providing them with analyses of the place of residence and mobility patterns of offenders.

Another crucial change between the old and the new versions of the software was cited by Okon (2018, In Egbert, 2019). Okon stated that the initial version of the software was used by a small number of users and the relaunched version is aiming to expand their user base by being browser-based[7], usable, and easy to learn. This could potentially strengthen the groundwork and ease the process towards the further platformization[23] of policing.

The relaunched software could also have different use cases in the future. Precobs Enterprise could possibly assist police officers to solve crime or convict offenders by developing or crosslinking different databases. If those databases are combined in one software package this could result in multidimensional data analyses *(*Egbert, 2019*)*.

Use case

Due to the increased number of residential burglaries in Germany during the last years, the decision was made to start using predictive policing software. This happened in 2015, in the state Baden-Württemberg, with a pilot project of predictive policing named P4. Due to the increased number of burglaries, the emphasis lies on place-based predictive policing. This approach focuses on making predictions about locations that have a heightened probability of crime occurring in certain areas and also at certain times (Gerstner, 2018).

As already mentioned, in PreCobs we could see that 'near-repeat victimization' has a significant role. This type of forecasting is based on observations about other events or different types of crimes that occur after the initial crime. The goal is to prevent such potential follow-up events by analyzing the data from the past five years. During the analysis, the system will rely on the so-called triggers. Those triggers such as the circumstances of an offence or the geographic location could indicate that near repeats or follow-up events are possible, but the system also could indicate the opposite and call for anti-triggers. Therefore, both the triggers and the anti-triggers are listed in a catalogue in PreCobs's system. The information in the catalogue can vary from stolen goods, modus operandi (method of entry, tools, etc.) to the locality of the crime (Schweer 2015, In Gerstner, 2018).

During the P4 pilot, PreCobs needed a small amount of data such as attributes related to trigger criteria, the address, date, and time. PreCobs also used a direct interface in order to import data three times a day to a database. After the import, the data (attributes) of the recent burglary cases are compared with the trigger catalogues that are mentioned above, and if there is a match between the attributes and the triggers in the catalogues, an automated prediction will be made. Thereafter, the automated prediction

will be checked for plausibility by the police officers, and they can either accept or reject it. If accepted, the local police will receive an alert and a PDF document with a map and the preferable times to patrol. The times to patrol are being visualized in the so-called operational circles that contain an area with a radius of 500-meter of the burglary that triggered the alarm. In the next 7 days, this area is then supposed to have a heightened risk of near-repeat burglaries (Gerstner, 2018).

Gerstner (2018) states that Precobs is not designed to predict all burglaries but to predict the potential burglaries that resulted from another act of crime in the area. Findings also indicated that the evaluation of the P4 pilot was not based on any financial gains but on an analysis of crime data, which could be beneficial for presenting the potential benefits of the software.

In the summary about the evaluation of the P4 pilot, Gerstner (2018) mentioned some positives about the use of Precobs by the local police. The positives are that the software needs a small amount of data which is mostly part of regular police work. Police officers noted that the way of working and integrating the software in everyday business was not difficult and making predictions was comprehensible. The use of Precobs resulted in a higher patrol activity both in vehicles and by foot patrol and also in occasional identity checks and vehicle inspections in certain areas.

There are however also some issues with this research. For instance, the shortness of the evaluation period and the lack of experimental design. This leads to the fact that a comparison between case numbers with previous periods could lead to limited insights. During the trial period, the police department of Stuttgart reported a decrease in burglaries, but this was also the case the year before, so the decrease cannot be linked with the use of the software and the new strategies. But as regards near-repeat victimization, the analysis showed that certain mechanisms took effect and no near-repeat patterns were found.

In the study (2018), it was seen that the intensity of police operations during alerts could possibly affect the scale of the near-repeat events and there was also a negative effect between the spatial and temporal proximity and the number of predecessor burglaries. Furthermore, the study found that if more events precede the originator (the first crime) would lead to a lower probability of near-repeat events.

Although this pilot of the software provided some interesting insights it needs more profound research. This is also the reason why since 2017 there is a second trial period in the same area of Baden-Württemberg. The goal of the second trial is to get a higher degree of certainty about the benefits of predictive policing and using the Precobs software in the context of residential burglary (Gerstner, 2018).

In this part about PreCobs, we mentioned spatial and temporal proximity, but what does this mean and why is it important? Focussing on the location of the crime and not on the perpetrators is one of the most critiqued approaches in policing. The reasoning behind the criticism lies in the fact that crime can simply relocate, and the offenders can keep executing their practices, but in a different location. With just a location-based approach, the "essence" of the criminal act e.g., the offender is less targeted. Of course, there is more to this approach, and it could possibly have some benefits, but it is important to consider the relocation of crime as a possible outcome of utilizing this approach (Bowers, et.al, 2011).

ShotSpotter

In 2018, ShotSpotter Inc. obtained Hunchlab's AI-driven analysis and predictive policing technology. This is a surveillance technology that alerts police agencies in real-time when a gun is fired. In order to achieve this, ShotSpotter uses audio sensors that pretty quickly can detect, locate, and subsequently alert the local police agencies. The data about the location of the gunfire is obtained in around 45 seconds after the gun is fired and the data about the gunfire incident could be in real-time delivered to police officer's different electronic devices (e.g., dispatch, patrol cars, smartphones, etc.).

Shotspotter uses audio sensors that are placed on elevated locations between 9-12 meters of the ground (rooftops, cell towers, streetlight poles, etc.) On those locations per square mile or 1,6 km between 15-20 audio sensors could be placed that are able to detect and precisely locate an impulsive sound that is most likely to represent a gunshot. This system also uses algorithms in order to filter the incoming data. Although the crucial part of the gunshot detection process is still dedicated to a human acoustic expert who needs to confirm the incoming gunshot alert (ShotSpotter, n.d.).

Once again, the importance of the human factor is showcased. As it is the case with all the previous predictive policing software, ShotSpotter should also be seen as a tool that can assist law enforcement officers.

Although this version of the software could be less applicable for the Belgian police forces as the laws for the possession of weapons differ from those in the United States. An article that was published in 2017, stated that in Belgium there are approximately 17,2 weapons per 100 residents. In the United States, this number is much higher at estimated 89 weapons per 100 residents.

ShotSpotter Connect

Next to gunfire detection, Shotspotter also provides other systems that are targeting crime prevention. This system is called ShotSpotter Connect and uses local data and AI in order to make a prediction about the possible location and the time at which a crime could occur. Besides that, the goal of ShotSpotter Connect is to be more efficient with the patrol resources and to minimize the biases in the system. The company also utilizes a proactive approach by attempting to place officers at places prior to the occurrence of crime. All this data can be used to form a patrol plan for each officer (ShotSpotter, 2021)

DETAILS OF THE CONNECT MACHINE LEARNING MODEL
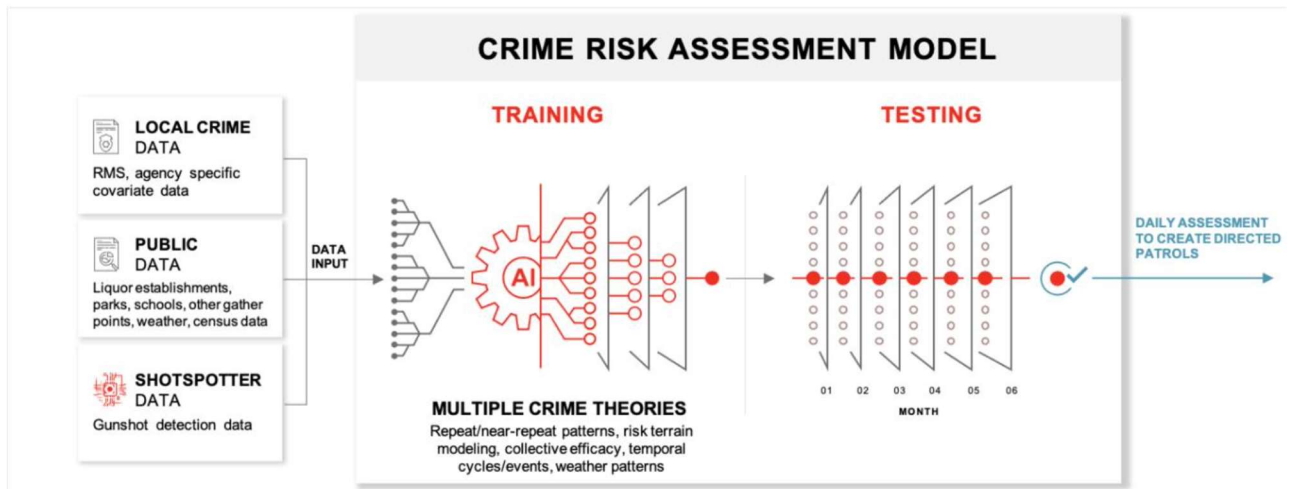
Figure 6: ShotSpotter Connect
(*Source: A citizen's guide to ShotSpotter Connect*)

In the picture above the working of Connect is pictured. Therein, we can see the first step being the data gathering and input and also which data the system uses. The second step is the "Model Training", wherein all the input is analysed by the artificial intelligence and the correlation between the data and possible crime occurrence. This is then followed by the "Testing" of the created models in the second step and those models are being compared with a crime that actually happened. Once the system and the models reach the intended accuracy they can be used by the units on the streets (ShotSpotter, 2021).

If any of our readers are interested in ShotSpotter a lot of information could be found on their website. We would like to mention that this is not a sales pitch for ShotSpotter. This software could also have downsides as in terms of privacy there could appear some issues. Although ShotSpotter claims that the sensors mentioned in the first part of the text record during the moments when a gun is fired and if there is not a case of gunfire the audio is only retained for 72 hours. The cost of such software could also be seen as a downside, as the yearly subscription fees are high and lie around $65.000 - $95.000 per square mile or 1,6km (ShotSpotter, n.d.).

Sadly, we do not have access to information about the costs of ShotSpotter Connect. Further, we also feel obligated to touch once again upon the shift from Hunchlab to ShotSpotter in 2018.

CAS (Crime Anticipation System)

As already mentioned, the Dutch police started in 2017 with the use of their own predictive policing software. The way that the 'Crime Anticipation System' works is explained by Rienks & Tuin (2011) by dividing a city map into boxes of 125 by 125 meters. The non-living areas for example water areas and grasslands are not included in the created boxes. Those 125 by 125m boxes are then linked to the belonging addresses and the data from the residents. The system uses data from the past three years and this way it can create an overview of the area. All this data is then used to create a logistic regression[20] (odds ratio, probability of certain events) in order to generate a model that the system can use to make predictions.

The predictions are possible to generate by the so-called 'neural networks' that can recognize and learn patterns. The patterns that are generated by the model are compared with real crime data. By doing that the neural networks can determine the difference between the predicted crimes and the crimes that occurred. The process of comparing the predicted crime data to the actual crimes that occurred will continue until the system can't deliver more accurate predictions. This process is called "loops" and it's a crucial part of making predictions and it is also a part of a process called "machine learning" that trains the neural network to generate more accurate predictions.

Rienks & Tuin (2011) mentioned that the 125 by 125-meter boxes also make use of 'risk scores'. Those risk scores will then be used to draft a heat map. The heat map will include the colours yellow, orange, and red, whereby a location or a box with a greater risk score will be awarded a darker colour on the heat map (yellow: low risk, orange: medium risk, red: high risk). In the picture below, we can see that the colours can differentiate from those that Rienks & Tuin (2011) mentioned.
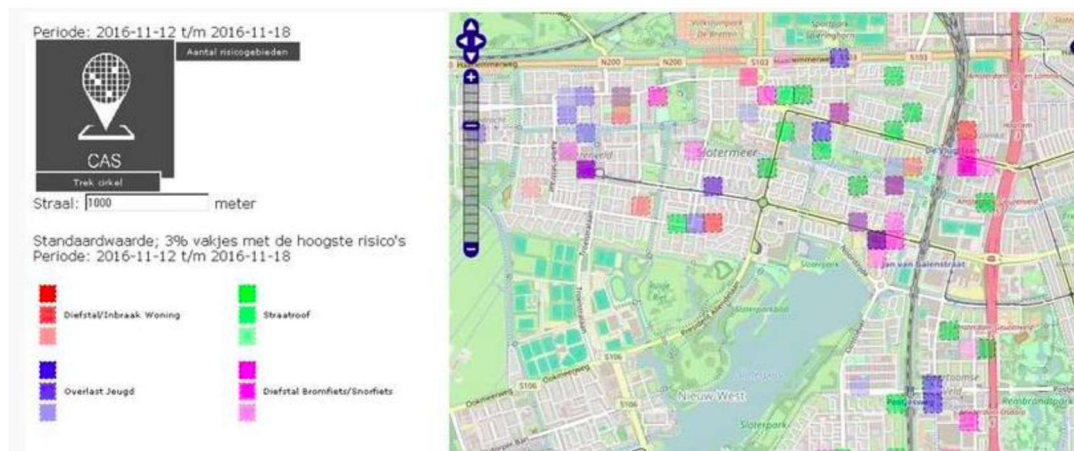
Figure 7: Picture of the interface of CAS (colour codes: red=burglary, green= street robbery, blue= disturbance by youth, pink= bicycle/scooter theft)
(Source: The politics and biases of the "Crime Anticipation System" of the Dutch police)

The Dutch police decided that only 3% of the highest risk scores will be represented according to their colour on the heat map. The reasoning behind this decision lies under the assumption that the areas with a higher risk score are already under surveillance. The selection of the 3% locations with the highest risk scores will then be drafted into an overview map. This overview map will be valid for one week and in order to make a prediction about the possible crimes that could occur, they divide 168 hours (1 week) into 21-time slots of 8 hours. When this is done they can proceed with the drafting of the so-called "CAS-map". In each of the 3% of the high-risk boxes will the probability of crime/incidents be displayed on a line chart and also on the "CAS"-map. By doing that the Dutch police can determine the location and timespan of possible crime scenes.

It is already mentioned that the Crime Anticipation System uses historic criminal data, but it also uses data about the nearest interchange (highway ramp), known criminal organizations, and social demographic data about the citizens. With the use of different data, they are able to visualize the 3% of the high-risk boxes on the previously mentioned "CAS"-map. Furthermore, the CAS also makes use of the databases from the Dutch police and other relevant crime data. All the input is then linked into a centralized system/data warehouse. As already mentioned above, the information in the data warehouse is from different sources and is constantly renewed. It is important that the input is of theoretical relevance and can be linked with the 'boxes' that the 'Crime Anticipation System' creates. If the data warehouse contains too much irrelevant information the predictions from the 'CAS' will be too much based on coincidence. This can undermine the level of acceptance, transparency, and quality of computer-generated predictions.

In the Netherlands, it is legally permitted to make use of the crime data but the 'CAS' cannot use data from police interventions. The only reason that is mentioned by Rienks & Tuin (2011) is that registration of the interventions is not structurally registered. We can make the assumption that in case the data from police interventions are relevant and registered in a structural way that it can be used in the 'Crime Anticipation System'. According to Rienks & Tuin (2011), the mean percentage of successful predictions of the 'CAS' about burglaries in Amsterdam lies at 30,6%. This percentage represents the burglaries that took place in the predicted 125 by 125-meter high-risk boxes or just outside this area. According to Willems & Doeleman (2014, in De Koning, 2020), the percentage of predicting cases of home burglary has a success rate of about 40%. One of the most important factors to predict crime that is mentioned by Bas Mali is to know why at a certain location and at a certain time the possibility of crime/incidents is high. It is also important to design and link historical data about the location such as crime scenes, testimonials, and possible descriptions of previous crime occurrences at the same location.

One of the three goals of the 'Crime Anticipation System' is focussing on efficiency. By using the predictive policing software, police departments can have a better idea about the location and the timespan that a crime can occur. This way they can better schedule their resources and increase or decrease the number of police officers that are scheduled for the day or for certain patrol areas (Waardenburg, Sergeeva & Huysman (2018).

Their second goal that is mentioned by Waardenburg, Sergeeva & Huysman (2018) is combining fieldwork with data-based decisions. By utilizing the big amount of data, the police officers can replace their "gut-feeling" and base their decisions on the data-driven approach. This new approach also can change their way of working from reactive to a proactive stance towards preventing crimes.

The last goal focuses on the importance of the 'CAS' and how the technology could be used for more than just to prevent crime. The technology could be used for safeguarding the lives of police officers and should be seen as important as every skill and tool. The authors even go a step further and compare the importance of the CAS to a police officer's personal gun in order to guarantee their safety (Waardenburg, Seergeeva & Huysman, 2018).

The pilot that intended to measure the effectiveness of the 'Crime Anticipation System' did not find any significant positive effect of the system on the cases of home burglary and the overall cases of crime. The pilot also exposed another shortcoming of the system, it can predict the location and in which timespan a crime can occur, but the system cannot declare why those crimes take place. All in all many of the opportunities of predictive policing remain unutilized (Mali, 2020).

Different use cases of AI & predictive policing software

Besides the three different use cases of predictive policing that we mentioned in the previous chapter e.g., hotspot forecasting, victim prediction, and perpetrator prediction, there are also other possible applications for the software.

In an article published in 2020, Tim Lau described the two most widely used methods in predictive policing being the "person" and the "place-based" approaches. This partition of the two methods can also be seen with Ferguson (2017, in Gerstner 2018) but he used the subdivisions "place-based predictive policing" and "person-based predictive targeting". Lau (2020) described the person-based method as an "*Attempt to identify individuals or groups that are most likely to commit a crime or fall victim to crime*". To form this type of prediction different risk factors such as past arrests, police records, or other victimization patterns. Good examples of the person-based approach for predictive policing are Chicago's police 'Strategic Subject List' (SSL) and London Metropolitan's police and their 'Gang violence matrix'. Both of those person-based approaches are already mentioned in the texts above.

The place-based predictive policing method described by Lau (2020) is focused on making plausible predictions about the places and the times with a high risk of crime. Those predictions are based on preexisting data and such an approach is used in the German P4 pilot in Baden-Württemberg. Their place-based predictive policing method focused mainly on residential burglary and is also mentioned in the texts above.

Camacho-Collados and Liberatore (2015, in Meijer & Wessels, 2019) developed a collaboration with the Spanish National Police Corps about the Decision Support System (DSS). This system focuses on efficiently distributing police officers in a certain geographic area. By doing this they hope to tackle the Police Districting Problem (PDP). This problem dates back to almost 50 years ago and as already mentioned the possible solution lies in the efficient and effective design of patrol sectors and a homogeneous distribution of workload (Liberatore, Camacho-Collados Vitoriano, 2020).

Saunders, Hunt and Hollywood (2016, in Meijers & Wessels, 2019) focused on a study that was focused on the evaluation of profiling systems. More specifically, they focused on the *Strategic Subject List (SSL)* that could be a helpful tool with crime prevention. The Strategic Subject (SSL) List makes an estimation about the risk of an individual being involved in gun violence. The estimation can result in two ways, either an estimation about the risk of being involved in gun violence as an offender or as a victim. Although the research did not find any significant clues that the listed individuals may have an increased chance of being a victim of gun-related crimes.

What the authors did find out is that the listed individuals have an increased chance of being arrested for shootings. But this could be affected by the officer's use of the Strategic Subject List as they used it as leads for unresolved cases. Another possible reason could be the extra monitoring that is exercised by the officers. But the real reason behind the increased chance of arrest remains unclear as it is also the case for the use of this predictive policing method (Saunders et al., 2016, in Meijer & Wessels, 2019).

Effectiveness of Predictive Policing

Just like police services that may be interested in working with predictive policing software, we find ourselves asking to what extent these different software packages are effective. In the previous chapter, where we presented the different software and their use cases, we briefly touched on the effectiveness. But the question about the effectiveness can be interpreted very broadly, as we shared different aspects of it e.g., effectiveness of the predictions, effectiveness of the deployment of personnel and resources, effectiveness in terms of finances, etc. As we can see there are a lot of variables that can be measured in terms of the effectiveness of predictive policing software.

According to Hardyns & Rummens (2017), the effectiveness of predictive policing is evaluated on the three criteria mentioned below.

1) Effectiveness of the predictive analysis
2) Crime rates before predictive policing was introduced and after it was introduced
3) Costs relative to current methods being replaced by predictive policing

If we examine those three criteria, we should get a better understanding of the effectiveness of predictive policing, so let's start with the first one.

The effectiveness of the predictive analysis is not an easy variable to measure. In fact, Moses & Chan (2016) discovered that most statistical techniques that are used in predictive analytics[25] are largely untested or evaluated in the field by independent evaluators. Perry (2013, in Meijer & Wessels, 2019) also touched on the importance of evaluation and stated that such (predicting) models should be assessed and evaluated. If not, this can lead to having outdated models and also presenting a skewed[27] image of reality.

"There is a need for a stronger empirical assessment of these approaches to understand the relation between features of the approaches and success in reducing certain forms of crime." (Meijer & Wessels, 2019)

We share the same opinion with the authors Meijer & Wessels, as we need more evidence to objectively determine the effectiveness of predictive policing methods and algorithms. Another good argument that the authors mentioned above made is about the evaluation of predictive policing in practice, as this can determine the benefits and drawbacks of predictive policing. As of now most of the companies that provide predictive policing software do not dispose of any relevant information about the efficiency of their system. It is important to emphasize the fact that not all types of crimes can be reduced by using predictive policing models. The police officers who use these models and apply these strategies could also have an important role in the effectiveness and efficiency, as they possibly could not comprehend the outcomes and certain decisions of the predictive policing software. This could have a negative impact on how police officers respond in certain situations and with that hinder the effectiveness (Meijer & Wessels, 2019).

However, Hardyns & Rummens (2018) had some data about the effectiveness of the forecasts made by the 'Crime Anticipation System' (CAS) in the Netherlands. The data goes back to the years 2013-2014, and it is stated that CAS could predict about 15% of the home burglaries in Amsterdam. The Dutch system also had a success rate of 36% meaning that the prediction about the possibility of crime occurred in the neighbouring grid cell of the actual crime event (De Graauw, 2014, 33 in Hardyns & Rummens, 2018). CAS also predicted 33% of the cases for mugging correctly and the percentage of cases that were almost correctly predicted was 57% (De Graauw, 2014, 38 in Hardyns & Rummens, 2018).

The fact that a certain system has a certain percentage of successful predictions is not an indication of crime reduction. Therefore, the effectiveness of prediction analysis is a difficult matter.

The second criterion, the comparison between crime rates before and after predictive policing was introduced, is a less complex variable to measure and so the answer to this question can be more easily formulated.

Firstly, to make a comparison, we are going to use the table from PredPol (p.5) that was mentioned but not thoroughly analyzed. The table contains the crime rates of a Southeastern city located in the United States. To make a comparison the city used crime data for the period between June 2018 to February 2019 when they did not use predictive policing software and June 2019 to February 2020 when the city utilized predictive policing software. Throughout the first year of deployment, the Southeastern police department only focused on two types of crime: personal crimes (robbery and aggravated assault[1]), and property crimes (burglary, vehicle theft, and vehicle break-ins). According to the table and the comparison between the crime rates, the utilization of predictive policing was the right decision, as the five named crimes were reduced as an effect. The biggest reduction of crime appeared in the crime category 'robbery', within the timespan of one year it declined by 44% (904 cases to 508 cases). The second-best reduction of crime appeared in the crime category 'aggravated assault[1]', within the same timespan it declined by 23% (1243 cases to 952). Further, the crime category 'burglary' declined by 20% (2171 cases to 1746), followed by 'UBAV' which declined by 15% (2161 to 1835), and 'MVT' which also saw a reduction of cases by only 4% (1617 cases to 1558).

In the case of the Southeastern city in the United States for some types of crime, we could see a significant drop in their crime rates. In another city, in the United States, a similar project was launched, but instead of measuring the crime rates before and after the utilization of predictive policing two different systems were compared.

The comparison was carried out by Levine, Tisch, Tasso, and Joy (2017, in Meijer & Wessels, 2019), as they also evaluated the implementation of predictive policing by the NYPD. The aforementioned researchers compared the results of 24-week cross-validation between traditional hot spot policing and NYPD's predictive policing software (DAS). The Domain Awareness System is a network of sensors that also makes use of databases, other devices, software and infrastructure. This network delivers information and analytics to the officer's mobile devices and desktops (Levine et al., 2017 in Meijer & Wessels, 2019). To monitor the criminal activity in New York, law enforcement made use of numerous tools such as environmental sensors, video analysis, ShotSpotter, and license plate readers.

Their goal with the comparison of the two different systems was to showcase the accuracy of predicting certain types of crime such as burglary, felony[14] assault, grand[15] larceny[18], robbery, and shootings. The results indicated that NYPD's 'Domain Awareness System' has increased the accuracy of predictions and especially for shootings. Another important factor that increased was the efficiency of the police officers as they disposed of more data and an extensive network, this way they could better respond to criminal behaviour. Since the implementation of NYPD's predictive policing system (DAS), the overall crime index in the city has decreased by 6%. The authors mention, however, that the decrease cannot be fully credited to the 'Domain Awareness System' (Meijer & Wessels, 2019).

The last out of the three criteria about the effectiveness of predictive policing software are the costs and how they compare to the cost of current methods. Unfortunately, there are not many sources that provide more insight and a general overview of the costs of predictive policing software. Therefore we are limited to the data that we established throughout our literature study about the cost of the different software mentioned in the texts above.

Firstly, we mentioned the costs of PredPol's - Geolitica software that was estimated to cost around $60.000 per year. The next software that we introduced was Hunchlab and the company that took it over i.e., ShotSpotter. According to Shotspotter's white paper (n.d.), a yearly subscription of ShotSpotter's software can cost a police department between $65.000 - $95.000 for installing their system within a perimeter of 1 square mile or 1,6 km!

Unfortunately, we did not retain any information about the cost of the Crime Anticipation System (CAS) as it was developed by the Dutch police for their own purposes.

As we can see the costs of those software is pretty high for a product that may or may not be effective if purchased. The data about the costs are based on our sources and some of them date back to two or three years ago. If any police organisations may be interested in utilizing this technology, we encourage you to do your own research and contact the company's officials, as we did not get the opportunity to do so. Also, a lot of the data about the price of the different software are estimations and should be interpreted with a grain of salt.

Further, we can partially answer our third question of "Costs relative to current methods being replaced by predictive policing". The only source of data that we have is from PredPol. In a white paper that was mentioned before they shared that a police department located in the United States was able to save more than 1,7 million dollars from officer's salaries. How they came up with this number is mentioned in the text above PredPol.

The data about the amount that this police department saved in just 9 months after the utilization of PredPol's software is questionable and should not be used in any circumstances as a measuring scale. As already mentioned, we would like each of the interested police departments to do their own research about this topic. With this paper, we are trying to present an objective overview of the little available data.

As a short conclusion about the effectiveness, we believe that predictive policing can be effective, but in order to be effective, a lot of factors need to be in check. We will address these factors in our short advisory note. This topic is generally not exhaustively researched and there is still lots more to explore. Even for us after the literature study, it is still difficult to fully grasp this technology and all its implications. This only proves the great complexity of this subject.

Possible complications

In this last part of the practical chapter, we will showcase some of the possible complications regarding the use of the technology. Besides the possible complications regarding the use of data that was mentioned numerous times, we also found other factors that could have a negative impact on different occasions.

Complications with predictive policing

The implementation and subsequent use of predictive policing do not come without any hurdles[16]. There are many implications that have to be considered with predictive policing. These implications range from practical to ethical hurdles[16] that all need to be overcome. For predictive policing to function optimally, there must be an awareness of societal acceptance, organisational acceptance and acceptance among officers in the field. With either of these topics, there are different complications (Rienks & Schuilenburg, 2020).

Complications concerning societal acceptance

In various countries, there is a social debate about whether the advantages of predictive policing outweigh the disadvantages. What predictive policing means, or entails, is not always clear to everyone. For society as a whole to accept such technologies 2 factors play an important role.

Brakel and de Hert (2011) argue that transparency and proportionality can increase citizens' acceptance of new technology. Transparency in relation to predictive policing refers to explaining how algorithms function, the data that is used, and the extent to which an algorithm makes a correct prediction. Transparency also relates to providing clarity on the use of predictive policing. For what purposes is the tool used and what is it capable of? This will come back when we talk about 'FATE'.

Regarding the proportionality of predictive policing, its deployment should be proportionate to the purpose for which it is used (Van Kempen & Van der Staak, 2013). Also, the 'performance' or degree of correctness of the new tool must be proportionate to how it is used. A clear assessment, for example through supervision by a judge or prosecutor, of the quality of predictions made by the algorithms can help prescribe where and when predictive policing can/should be deployed and under what conditions (Das & Schuilenburg, 2018). In Belgium, many of these issues currently do not have a secure, legal framework. Partly because the social and political debate is still ongoing.

Complications concerning organisational acceptance

By organisational acceptance, we mean that the introduction of new tools and the associated processes in the police organisation should ideally be beneficial. In practice, implementations of new technologies often prove to be time-consuming processes of adjustment (Rousseau & Gunia, 2016). Conservatism, hierarchy and a general sense aversion to change are often identified as relevant factors that explain this within organisations (Lum & Koper, 2017). Ingrained methods of working can also be a factor standing in the way of new forms of police management (Sparrow, 2015).

To make major changes within the police possible, the leadership has to have a uniform view on the matter in the desired direction. This involves leadership that creates room for experimentation and introduces rewards for successes (Flight, 2017). A trade-off between a phased and 'big bang' implementation is an example of a choice that can make or break a successful adoption (Rienks & Tuin, 2011). Moreover, the visible involvement of top police management is necessary for the organisational acceptance of predictive policing (Damanpour & Schneider, 2006).

Complications concerning the individual police officers

The enthusiasm from the part of the officer in the field is essential to make predictive policing a successful tool in practice. The police officer who works with predictive policing must be confident that the results are correct and experience the use of predictive policing as logical and pleasant. He must also know what to do with the output that he receives, either directly from the program, or from people responsible for 'translating' the input to direct orders. Different conflicts and questions may arise with the implementation of predictive policing such as: "Who is right: the system or the officer?", "Can the system be ignored?" ," What if the system is right?". Such questions introduce new choices that a police officer must make within his profession when acting according to his own judgement (Mali et al., 2017).

There is also the concern that predictive policing could cause the human dimension to disappear from police work. By outsourcing the making of investigative choices to technical devices, human characteristics such as conviction and intuition are in danger of falling overboard. The risk of dataism, a blind faith in data and algorithms, lies in wait. This blind trust makes a police officer less critical and autonomous (André et al., 2017). This could have the effect that all police officers will have a standardized way of thinking and acting. This could be further enhanced by the fact that the deployment of this new technology can also be used to control the behaviour of police personnel themselves (Rienks & Schuilenburg, 2020).

Finally, a prescriptive system can bring with it a sense of disregard for the skills of the officer himself (Ratcliffe et al., 2019). Research shows that Dutch street officers are critical of predictive policing and have little confidence that it helps them in their daily police work. The investigated officers are mainly guided by their own normative views on what good police work looks like in practice (Drenth & Van Steden, 2017). It is therefore not surprising that a police officer who has built up his knowledge about a neighbourhood himself is more inclined to follow his own judgement than a system that indicates where to patrol (Koper, 2015). Training, guidance, and contact with the outside world are important factors that can increase receptivity to this new innovation (Flight, 2017).

Chapter IV: Legal

Introduction

In this chapter, we will be exploring the legal framework around the use of data-driven artificial intelligence in law enforcement and beyond. Since our research centers around the Belgian police, we will be focusing on European Union legislation. The EU legislation forms a guideline for member states in developing their own national legislation around data processing and automated decision making, predictive policing falls under this. These EU regulations form the base for Belgian legislation.

General Data Protection Regulation

This regulation entered EU law on the 23 of May 2018 and stands in for the protection and processing of personal data. With this regulation, EU citizens are the beneficiaries of certain rights.

Art. 2 GDPR Material scope

1. This Regulation applies to the processing of personal data wholly or partly by automated means and to the processing other than by automated means of personal data which form part of a filing system or are intended to form part of a filing system.

2. This Regulation does not apply to the processing of personal data:

    1. in the course of an activity which falls outside the scope of Union law;

    2. by the Member States when carrying out activities which fall within the scope of Chapter 2 of Title V of the TEU;

    3. by a natural person in the course of a purely personal or household activity;

    4. by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, including the safeguarding against and the prevention of threats to public security.

(Art. 2 GDPR – Material Scope, 2018)

As you can see from Art 2.4 GDPR, Data processing with predictive policing by a competent authority, such as the Belgian police, are excluded from this law. This article makes way for the law enforcement directive or LED. The LED focuses precisely on data processing by a competent authority for law enforcement purposes. This exclusion can give a misleading impression that there is a division between LED and GDPR but the interplay between these legislative[19] instruments is complicated. Even if the data processing is done by a competent authority, it is not clear if LED will apply. The purpose of the processing of the data will determine which legislative[19] instrument is applicable. For example, if a competent authority transmits data to a non-competent authority, the LED will apply, for instance, a data transfer from the police to a software provider. If the usage of the data is for non-law enforcement purposes, the GDPR will apply, for instance, medical data sent to social services. It is possible that both legal elements are not applicable for certain situations. The LED and GDPR do not apply for national

security purposes (Art.2(3) and recital 14 LED). The boundaries between law enforcement activity, national security, and public security are not always clear. The Court of Justice of the European Union deals with this distinction, making a line between criminal enforcement activity and national security measures.

Law Enforcement Directive

First, it is important to know what is meant by a 'competent authority' which falls under the scope of LED. The Law Enforcement Directive will govern automated decision-making for law enforcement activities.

'Any public authority competent for the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, including the safeguarding against and prevention of threats to public security; or any other body or entity entrusted by Member State law to exercise public authority and public powers for these purposes.' Art3(7)(a,b) LED

Criminal justice profiling and EU data protection law: precarious protection from predictive policing.

The definition for profiling provided for the GDPR is the same as for the LED.

'Profiling' means any form of automated processing of personal data consisting of the use of personal data to evaluate certain personal aspects relating to a natural person, in particular, to analyse or predict aspects concerning that natural person's performance at work, economic situation, health, personal preferences, interests, reliability, behaviour, location or movements.

(Art. 4 GDPR – Definitions, 2018)

Automated decision-making (ADM)

Automated individual decision-making Art 11 LED

'Member States shall provide for a decision based solely on automated processing, including profiling, which produces an adverse legal effect concerning the data subject or significantly affects him or her, to be prohibited unless authorised by Union or Member State law to which the controller is subject and which provides appropriate safeguards for the rights and freedoms of the data subject, at least the right to obtain human intervention on the part of the controller'.

(Art. 22 GDPR – Automated Individual Decision-Making, Including Profiling, 2018)

Automated individual decision-making Art 22 GDPR

The data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.

(Art. 22 GDPR – Automated Individual Decision-Making, Including Profiling, 2018)

If we compare the last two articles, we can see the difference between them. In Art 22 GDPR there is an emphasis around 'shall have the right' meanwhile Art 11 LED is formulated as a prohibition. As a result, Art 11 LED is more restrictive than what is written in Art 22 GDPR. So, Art 22 GDPR provides somewhat limited protection by allowing data controllers to adjust their behaviour only when an individual explicitly invokes their rights. For instance, the rights to rectify or to erase (Art 12-22 GDPR)), data controllers must respect the principles relating to personal data processing and ensure the lawfulness of that processing (Arts 5 and 6 GDPR).

According to the GDPR data controllers can use automated decision-making if it is for contractual purposes or if the data subject gives consent, within the LED this is not possible. The reason for this is that there is a clear imbalance between the data subject and the data controller. There is however a limitation to the ability to give or withdraw consent, sometimes you do not have the ability to object to data processing. For example, you cannot object fingerprints for passport applications.

Art 22 GDPR states that automated decision-making is permissible if the Member state provides legislation. The legislation must safeguard the rights and freedoms of data subjects and give the right for human intervention and all of this must be compatible with the EU Charter. Human intervention must have enough authority to change decisions made by automated decision-making. This way law enforcement can use automated decision-making if it is provided by Member State Law. In other words, by making legislation, it is possible to sidestep Article 11 LED. Besides this Article 11 LED is limited in other ways. LED applies only to automated decisions made by automated processing. As a result, if there is a human judgment in the final recommendation then Art LED 11 does not apply because it is not fully automated. To have effective legal protection, law enforcement agencies must be able to give an explanation of an individual decision and not only the logic behind ADM systems.

The GDPR allows automated decision-making in a wider range but on the other hand, there are more safeguards for individuals. Within the GDPR you have the right to give your point of view and contest any decision that has been made. This is not required under the LED. If the decision-making is based on sensitive data Art 11(2) LED applies. This article states that such decision-making will not occur unless there are measures taken to protect the rights and freedoms of the data subject. This means that the Member States have a lot of responsibilities and discretion. Also, competent authorities need to keep in mind that within LED it is strictly prohibited to do profiling that leads to discrimination on basis of sensitive data (art. 11(3) LED).

The definition of Art 11 LED states to trigger this legislation there must be an 'adverse legal effect'. Within the GDPR there does not necessarily need to be an adverse legal effect for the data subject, any legal effect or similarly significant effect will do. So, if there is an ADM with a trivial effect, Art 11 LED and Art 22 GDPR will not apply.

The Harm Assessment Risk Tool (HART)

In 2016, the world's first AI tool for making custodial decisions was installed. This happened in Durham (UK) and was designed to help the police officers. The Harm Assessment Risk Tool (HART) is an AI-based technology that uses 104,000 histories and previous data about Durham's arrested and processed residents in the past five years.

The AI-based tool aims to categorize if the offender is a high risk, moderate risk, or low risk to commit a crime. To make such a prediction, the model focuses on the so-called 'predictor values' that contain the suspect's offending data (criminal data), and the offender's age, gender, and geographical area. Dr. Barnes from the Jerry Lee Center for Experimental Criminology also mentioned that the HART model will be refreshed with more recent data. Further, he explained that the variables mentioned in the text above are combined in thousands of different ways before the AI tool can reach a final forecasted decision.

The overall accuracy of the HART model is around 63% an independent validation study has found. As the model is based on machine learning it is not supposed to not make errors at all, but it can 'learn' and decide which errors the model must want to avoid. The system has a much higher success rate of 98% with making predictions about an offender who is predicted to be 'low risk' but then commits a serious violent offence. Dr. Barnes and the researchers share that the HART model should still be seen as a tool to support human decisions and the model's outputs should only be used for guidance (Research Horizons, Issue 35, pp 32-33).

The complexity of the matter can be shown by the example of the Harm Assessment Risk Tool. As already mentioned, the HART system is used to calculate to what extent someone will commit a crime. The calculation is done by thirty-four inputs. Some of these inputs are related to prior offences. This information would be collected by a competent authority and therefore the LED will apply to this processing. However, there is also data in the inputs that come from public sources. For the processing of this data, the GDPR-legislation will be applied. We already mentioned the differences between the GDPR and LED in theory, but in practice, they are difficult to disentangle[13].

As mentioned above in order for Art. 11 LED to not apply, the decision must have human input. Here can be argued if the HART-recommendation does affect the individual or the final human decision. On this occasion, a closer examination is needed. Here lies the discussion if a tool, for example, HART is used to base a human decision, but if so, is it still a solely human decision? In this occasion, it is important to what extent the final decision entails discretion and judgement by the officer who is making the decision. If the officer just bases his decision on the recommendation of the HART-system, this will

still be seen as automated. If the officer bases the outcome of the HART- system and makes a human judgement out of that, LED 11 will not apply.

Conclusion legal

Within the legal framework for predictive policing, it is not always clear which legislation is applicable. So, if law enforcement encounters these legal waters, it is best to involve legal experts in the process. Depending on which form of predictive policing is used, there can be unique challenges. It may be in the best interest for the government to develop law enforcement regulations on the use of AI and how it should act keeping the LED and the GDPR in mind. As proven with the HART, it is not always clear which legislative[19] instrument could be applied in practice, therefore the need for legal expertise is a must.

In Belgium, such legislative[19] instruments are made. In the case of collecting data for a police process, the following legislations apply:

- the Police Service Act;
- the Integrated Police Act;
- the Code of Criminal Procedure;
- Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data and on the free movement of such data;
- the law of 30 July 2018 on the protection of natural persons with regard to the processing of personal data.

To enforce the correctness of these legislations, organizational measures were taken. Local police zones have a data protection officer or DPO for short. These DPO's ensure that personal data is processed with care for privacy and security. They check whether the police zone complies with the regulations. Besides this, the department: Directorate of Police Information and ICT Resources exists. They have seven tasks, one of them is managing information on legal advice and regulations. And finally, the General Inspectorate of the Federal and Local Police. They investigate the services of the federal and local police.

In addition to this, there are also independent bodies that monitor police work: Comité P and supervisory authority on police information (COC). The COC is an independent federal parliamentary institution that makes sure that police follow its legislation for the use of information and data. Comité P is charged with supervising the overall functioning of the police services. The legislation and the practical implementation makes it possible to do predictive policing in Belgium, but a close examination by experts is needed.

Chapter V: Ethical

Introduction

As mentioned earlier predictive policing is a continuation of the evolution from a reactive style of policing to a proactive style of policing. A lot of people have different ideas about this topic. Often, just the word 'police' is enough to start a discussion. When talking about predictive policing, multiple issues are often brought up. Is it right to be constantly surveilled by cameras and other sensors which have been installed out in public spaces to increase the sense of security? Should we sacrifice some of our freedom and our privacy for more safety? There are many varying opinions on whether or not our societies need more policing. Artificial intelligence offers many potential opportunities for a more effective, proactive police force. But it can also introduce complications and ethical dilemmas. For example, the risk of discrimination because of statistics. Or the risk that decisions are made in a black box[6] of which no one understands how it works. Another question is how to deal with the potential false information that comes out of this. Who is accountable for the decisions that are made (Rienks, 2015)?

It is important to consider these ethical and other relevant aspects that may influence the successful introduction of predictive policing. Not only because it could have a major impact on society in terms of relations between state and citizens, but also because in general, people don't know how these technologies work. Ignorance often makes people unloving towards certain things, this could be the case for predictive policing (Rienks, 2015).

What are the misconceptions?

There are some misconceptions around the topic of predictive policing. A misconception is a misconstrued[21] conclusion, based on faulty thinking or false facts (Misconception, n.d.). There are positive misconceptions that glorify predictive policing as the ultimate key to a safer society as opposed to negative misconceptions which vilify predictive policing as an authoritarian tool. Nevertheless, whether positive or negative, they remain misconceptions.

A common misconception is that people portray AI and algorithmic systems as being more precise, effective, and objective because these systems do not suffer from human weaknesses (Stevenson, 2018). Further, people think that replacing various aspects of police work with prediction tools and AI systems would make the public enjoy more effective policing for less money, the likelihood that innocent people will get caught up in the criminal justice system will be reduced and that the probability that criminals will be caught and prosecuted will be greater.

Positive views appear to have infiltrated police organisations, the commercial entities developing predictive and AI technologies and academia. From narrow pilot studies, inflated assessments about the general performance of predictive- and AI technologies have been made (Berk et al., 2009; Russell and Norvig, 2014). Inflated assessments of performance are confined not only to commercial AI developers who sell technologies to police services in a highly lucrative and competitive market but scientists and academics have also been accused of exaggerating findings as they chase research funding, downplaying the peculiar nature and narrowness of their particular models (Richards et al., 2016; Nagendran et al., 2020). Complicating the landscape further is the fact that a broader shift from policing as a reactive, crime-fighting role to more of a victim-focused, risk-based, preventative role is taking place in various crime areas. Addressing these problems through cost-effective and scalable technologies carries a particular attraction. Police forces may even consider the procurement of such technologies to be necessary to carry out their basic functions and to maintain the rule of law with the

limited resources available to them (Ibid). The promise of drastically reduced crime rates increased public safety, better value for money and smart-on-crime policies ticks many boxes. These factors arguably create quite strong incentives for police services to develop and employ digital technologies within remarkably short timeframes. Their allure is that some police services have even procured them with little or no competitive bidding or evidence that they work in practice (Stevenson, 2018; Valentine, 2019).

The opposite conclusion concerns an array of negative qualities associated with predictive policing and AI. Serious concerns about data privacy and the accountability of complex and non-transparent predictive systems (Shapiro, 2017). Being able to scrutinise machine learning systems, some of which are so complex that they are referred to as 'black box[6]' systems is a key concern (Ferguson, 2017b). Critics contend that predictive policing and AI technologies can be harmful in reality, that they can even do more harm than good in many contexts (Moravec, 2019). Some sceptics argue that the use of predictive and AI technologies in policing is so dangerous that they should be abandoned in their entirety (Liberty, 2019). Partly as a result of the negative factors associated with AI, surveys in the UK have shown that although the public has a 'very limited awareness' of how AI tools work, people tend to have an "unduly negative view" of them (HLSC, 2018: 23). There is frequent mention of the negative portrayal of AI in Hollywood movies as a reason for this.

Predictive policing erodes trust between government and citizens

A basic principle of a democratic constitutional state is citizens are subject to the presumption of innocence: people are innocent until proven guilty according to the law. However, with predictive policing, this is turned around. All citizens are a potential risk, although in practice the system will assess most citizens as "(very) low risk" (De Koning, 2020).

This has far-reaching consequences. Predictive algorithms can theoretically use all data as input. Smart cameras on the street or ANPR systems that watch and analyse traffic flows. Fraud detection systems that combine a multitude of data from municipalities, tax authorities, social services, etc. to create risk profiles for possible fraud. This means that all this data that citizens, consciously or not, provide to the government can be used against them at any time. But when and how, no one knows: the exact way these algorithms work is nearly always secret. Decided on the grounds that fraudsters and criminals are not allowed to know what the government is paying attention to.

This means that a citizen, who currently provides data to the government in good faith, in order to obtain a permit, apply for a benefit, or to file a tax return, will always have to take into account that under a regime of predictive policing, the data could end up in a control system and be used against them. This introduces a mutual distrust in the relationship between citizens and state: the state no longer assumes the innocence of the citizen; the citizen can no longer assume that the state is acting in good faith.

Discrimination and prejudice within predictive policing

Unequal treatment based on personal characteristics such as age, religion, race, gender, skin colour or origin is not permitted. An example: when a crime is mainly committed by young men it does not make it legitimate to focus on young men in a preventive frisk. This goes against discrimination laws. If continuing along this line, you could question selective surveillance in disadvantaged neighbourhoods based on acquired information. Where the crime is, is where you want to be as a police force. These technologies provide this information. But is it justifiable to use knowledge and statistics about crime to carry out selective checks?

Discrimination

From a mathematical point of view, to discriminate means to make distinctions. A completely different meaning than the word has in everyday language. In this sense, making a distinction is nothing more than applying focus or filtering data in order to retain more relevance. Working with profiles and giving selective attention is, in a mathematical sense, always discriminating. If the police achieve the best result by focusing on prioritised persons or offences, they make a distinction. A non-random police deployment is quickly labelled as discriminating in a non-mathematical sense. This often has to do with the idea or feeling that the police make a distinction based on ethnicity and race. If certain population groups are overrepresented in crime statistics, is it socially acceptable to pay extra attention to them? An interesting discussion about which the last word has not yet been spoken (Rienks, 2015).

Overrepresentation in crime statistics can lead to stigmatisation and therein lies a risk of discrimination against minorities. The police should or could take this into account when declaring a situation suspicious. It is therefore certainly advisable to profile on behavioural aspects in particular, rather than on personal characteristics when recognising a suspicious situation (Çankaya, 2012). Distinctive characteristics that emerge from knowledge or data should be objectively tested by using random samples. A risk that lurks in the retrieval of characteristics from knowledge is that one generalises on the basis of stigmatisation and stereotyping, whereby a few incidents may be too quickly turned into patterns that do not correspond to reality. It is easy to have a certain bias because of one or two wrong experiences.

Prejudice

Another fundamental problem was touched upon in a case of proactive patrolling in New York: minorities are monitored disproportionately. Predictive policing based on big data seems to be a purely objective and rational analysis, unrelated to any prejudices or ingrained habits of police officers. This is false. The software is fed and trained with historical data from police databases, which have been filled over the years by various police officers. If some of those officers were or are prejudiced against certain groups or people then a significant number of people from those groups will have been arrested and will have a record. Since more problems or crime occurs in certain neighbourhoods, people living in these specific areas will show up more often in police computer systems. Because such systems are often self-learning, any bias in the original dataset[9] will become self-reinforcing. This can lead to a 'self-fulfilling prophecy[26]', with certain neighbourhoods receiving more and more attention (De Koning, 2020). The report "Algoritmes en grondrechten" explicitly mentions the Amsterdam CAS as an example of a system that can "lead to intensified surveillance in neighbourhoods where ethnic minorities are overrepresented (Vetzo, 2018).

Responsible use of Artificial Intelligence and Predictive Policing

When using an important tool such as predictive policing it is a necessity that the usage is responsible. The Oxford Dictionary defines 'responsibly' as acting "in a sensible or trustworthy manner". To achieve this, police forces who use these technologies must guarantee that the use and the design of these algorithms comply with four factors. These are: **fairness, accountability, transparency and explainability** (FATE). These factors developed over the last few years from a consensus within the AI community. It covers what algorithms require to justify placing trust in them, but also to assure a certain level of safety (INTERPOL-UNICRI, 2020). These four requirements are very closely tied in to each other and intertwine on different levels.

Fairness

Fairness implies the decisions made by the algorithm must not create a discriminatory or unjust impact on the end result in any way. These algorithmic decisions should not be made based on attributes, such as ethnicity, gender, sexual orientation, as the results may lead to discrimination. Avoiding these characteristics is also not a solution because they could end up being indirectly derived from other criteria (INTERPOL-UNICRI, 2020).

Accountability

Accountability has two different meanings in the context of policing: it is either concerned with the control of the police or the fact that the police must explain their way of acting (Bovens et al., 2014). describes accountability as follows: "Accountability involves the provision of answers to others with a legitimate claim to demand an account, with consequences.

Predictive policing raises at least two difficulties regarding accountability. This in the sense of giving explanations. First, there are the challenges of responsibility for the making of decisions and second, there is the challenge of the explanation itself (Moses & Chan, 2016).

For the first problem, an example could be where a police officer is asked to account for the decisions he made. This person could refer to the decision to use particular software and the output given by that software on that particular day. However, when doing this, it deflects the answer rather than giving the account. The challenge here is the tendency to redirect aspects of the decision-making process, and thus responsibility and accountability for the decisions made, to technological tools. If this tool is neutral, such as a word-processing software, this will rarely be a problem. However, as we know now, tools for predictive policing depend on multiple assumptions of which the decision-makers themselves may be unaware.

The second concern would be the ability to dig deeper for more information. An explanation of the software itself could either be based on an explanation of how the software works (requiring transparency and comprehensibility) or on an explanation of its effectiveness.

Transparency

In the context of accountability (Meijer, 2013) defines transparency as such: "The availability of information about an actor allowing other actors to monitor the workings and performance of this actor". If there is comprehensible information available that shows how data is collected, how it is stored and altered. Or how the data is matched or combined, the algorithms and processes used (the source code[28]) and the assumptions and biases present in the data. But also how the output is presented towards the decision-makers. Once all of this is clear, the decision, including the reliance on the software, is then open to evaluation, critique, feedback, and formal sanction where needed.

Explainability

Explainability is very closely related to the requirement of transparency. It is different in the sense that it focuses on the fact that all these algorithmic decisions need to be understood by the end-users. The 'normal people' to put it bluntly. It must be explained in non-technical terms, which is not always easy. Here is where the 'black box[6]' issue arises. These algorithms are black boxes that arrange and combine different aspects in arbitrary[4] ways. What happens between the input and output may not be and is often not clear. Unlike the other requirements, this one is quite a technical challenge for developers and manufacturers. However, several groups are trying to create tools that explain and present this technology in understandable terms (INTERPOL-UNICRI, 2020).

Nonetheless, for multiple reasons, full transparency and comprehensibility is rarely possible in predictive policing. Software may be subject to protection in licensing contracts where the source code[28] is hidden. Even when the source code[28] is available, there may be certain properties of the algorithm (particularly in the case of machine learning) that cannot be predicted or understood. Next to this, the person to whom an account is given may lack the knowledge to deduce biases that are inevitable in the choice of algorithm or process of analysis. Other assumptions mentioned above, like those present in processes of data collection, may be poorly understood so that there is little evidence to confirm or counter the assumptions made in the process. Even if full transparency and comprehensibility would be an ideal form of accountability, in practice it is often not possible and other solutions need to be found (Moses & Chan, 2016).

Ethical Conclusion

In the context of predictive policing the following question is often asked: "Can predictive policing be both ethical and effective?" (Can Predictive Policing Be Ethical and Effective?, 2015).

Even with the research that has been done concerning this topic, there is no clear and objective answer to this question. In his answer to this question, Papachristos (2015) says that "algorithms might help narrow the focus and reach of the justice system, leading to fewer and fairer contacts with citizens. But it cannot happen if police and prosecutors use data without oversight or accountability." He is stating that full accountability has to be taken by the actors that use the tool. Placing humans as the ethical governors of predictive policing does not answer if predictive policing can be ethical and effective but rather attempts to figure out how it could be both. The more these techniques become routine and the more they spread in the different fields of our society, the more our perspective will change *(Karppi, 2018)*.
It is hard to sketch an objective ethical framework for predictive policing. That's why in this chapter we just tried to define the multiple complications and ethical challenges related to predictive policing. In the future, this might be easier if predictive policing becomes more mainstream in our society and more people understand what the implications are.

Qualitative research

Plan of action

Who?

In total, we had the opportunity to interview 16 key figures within the Belgian police services, each of whom added relevant value to the research in their own way. The fact that we were not only looking within the local police zones, but also had respondents within the federal police was an added value.

How & what?

Key figures were selected based on positions within the Belgian police services that seemed relevant to our research. We found most of the contact information online through police zones and functions. A number of persons could be contacted through students who followed an internship within a police service. In total, we contacted 30 possible key people, of which about 14 came up with a positive response. Those who could not participate in the study indicated that the time was too short to prepare for the interview or non-response.

Data collection

To collect the data, we used a personal email address of predictive policing, with which we contacted possible key figures. Due to time constraints, we were able to conduct 12 interviews, which lasted an average of 1 hour. Since there were 6 of us in the group, each student had the opportunity to conduct 2 interviews. After conducting the interviews, each student was responsible for writing his interview out so that the analysis could proceed in an orderly manner. The recording and transcription were done according to a list of five topics. For the analysis of the interviews the different topics were collected together, and in this way, it was possible to analyze them.

Our questions and topics that were discussed during the interviews can be found on the next page.

Interview scheme

Introductory questions

- Can you briefly introduce yourself and your position within the police force?
- Did you have knowledge of predictive policing before this interview?
- Do you have knowledge of "modern" (computerized) technologies used within the Belgian police?

Practical aspects

- In your opinion, is the technological infrastructure of the Belgian police advanced enough to support PP?
- Do you think that PP could be a practical added value for your police force/service?
- How can such technologies best be integrated within the Belgian police? (Police training/internal training)

Future

- As some neighbouring countries already have this in place, do you think PP will also spread to Belgium?
- Are such investments already on the agenda somewhere?
- What type of PP do you think will be used if implemented within the Belgian police? (hotspot prediction, perpetrator prediction, victim prediction)
- In your opinion, is there a concrete reason why PP is not yet used within the Belgian police force?
- What is the plan for the future within your police force in terms of technology?

Ethical & Legal aspects

- Where is the line between legitimate data collection and privacy violation in your opinion?
- Is there a legal framework for the use of PP within the Belgian police?
- Do you think PP fits within the deontological framework of the Belgian police?

Concerns

- What do you think are the disadvantages of PP?
- What do you think are the advantages of PP?
- How high do you rate the willingness of police personnel to use predictive policing?
- What is your opinion about the degree of acceptance of the citizens, if this type of technology were to spread to Belgium?

Closing

- Do you have anything else you would like to share that was not covered during the interview?
- Do you know any other relevant actors that we could interview about this topic?
- Are you willing to distribute our questionnaire on this topic within your police department for a quantitative study?

Qualitative analysis

Introductory questions

We had the opportunity to contact 12 key people, all of whom are individually employed by a particular police department within Belgium. From the beginning of the analysis of the interviews, we noticed that the majority of the respondents had some prior knowledge on the subject of predictive policing. Some had been introduced to it in the Netherlands, with the CAS system. Others acted out of their own interest and have done research over the years. It was mentioned that today, predictive policing falls under the heading of intelligence-led policing, for both judicial and traffic offences. Throughout several interviews, it was noted that research into predictive policing had already been conducted, by other Bachelor students as well as by Ghent University. This also means that respondents are more familiar with the system.

When asked if respondents have knowledge of other "modern" computer-based technologies used within the Belgian police, similar answers came up. The system that often came up was the FOCUS system: this tool allows for quick and efficient information consultation within the police department, with security being a key focus. One respondent also indicated that within his/her zone they work with GIS packages. This stands for integrated/geographical information system, where you can map crime data. In this way, they can for example designate black spots where dangerous intersections are.

"Within our zone, we regularly have to deal with quick thefts. With the help of this system, we can pinpoint where this crime occurs and also when it usually happens. We use this information to be able to monitor. This is also a bit of forecasting as we use information from the past, it is a kind of hot spot analysis" (Respondent 4).

Since 2015, a modern, efficient working environment for police officers has been built within the police department, using tools that support collaboration. As a result, since a few years ago there has been a collaboration between Microsoft and the Belgian police services to create a sustainable and highly secure working environment. This also enables the services to share information smoothly via the personal email addresses that each officer has. The fact that digital meetings can be organized is also an upgrade for the information flow between the services.

Practical aspects

The first practical aspect that was discussed was whether the Belgian police currently have the necessary technological infrastructure to support the use of predictive policing software. Most respondents seem to agree that the technological infrastructure is not quite unilaterally there yet. There are several hurdles which according to our respondents still stand in the way of implementing predictive policing technologies effectively.

"The necessary knowledge and infrastructure to support predictive policing is certainly present to an extent, but the question remains if such a system can be implemented within the operational procedures of the police on a national scale" (Respondent 1).

"Certain police services would be able to implement this (predictive policing) given certain investments, but on a national level the infrastructure is not sufficiently advanced" (Respondent 3).

Several respondents noted the unequal funding between different branches. For instance, at the federal level, there are often fewer financial resources available to adopt new technologies than at the local

level. According to our respondents, this is due to differences in the way the federal and local police are governed and funded. While the federal police are beholden to and funded by the federal government, local police services receive their funding and policies from local government bodies within their territory. Even among local zones, the disparities in available resources can be large, depending on the number of residents living within a certain zone. Zones with more residents often have more financial means than their smaller counterparts.

"The federal police generally have fewer financial resources than the local police, the availability of financial resources are directly tied to the ability to acquire and test innovative software and technologies" (Respondent 9).

Because of differences in funding among local police, many local zones adopt technologies from the private market independently of each other. In turn, this leads to a sort of technological fragmentation among local police. For instance, respondent 9 reported that their police zone had consulted a private firm to acquire a 'smart query' software package that allows targeted searches for certain characteristics when looking through surveillance footage.

Next to differences in funding the local and federal police also use different base software systems. The local police use the ISLP (Integrated Services of Local Police) while the federal police use Fides. These systems have reportedly been made compatible with one another, but one respondent notes the lack of an overarching system to integrate and fully exploit the different systems. Taking into account the fact that many local police zones have software that is licensed to them by private companies, this could make integration of these various systems even more difficult. According to respondent 6 police are trying to address this with their 'I-police' project, which is slated to be released in 2024.

"Basic applications and structures such as databases are sufficiently available. There is however a lack of an overarching management system to bring all of this together and exploit it fully" (Respondent 6).

The next topic which was discussed is whether or not respondents thought predictive policing could have added value for their service. The majority of respondents agree that it can indeed have added value. For instance, it was often noted the potential to shift to a more proactive method of policing as a possible benefit of predictive policing. However, respondents were cautious to approve any predictive policing system entirely as-is.

A concern that often recurs throughout the different interviews is that studies into predictive policing pilot and trial programmes have yet to show solid results. As long as the added value cannot be backed up with sufficient evidence, many police services report that they will hold off on investing in the technology. Some respondents referred to recent studies of the Crime Anticipation System used in the Netherlands, which show that it only provides little added value.

"I have mixed feelings about the added value. I have some doubts about the effectiveness of predictive policing as it is still very much in its infancy. I haven't personally seen it deliver its promised results yet. Investing in such a novel concept is a risk" (Respondent 4).

The last practical topic which was discussed was how predictive policing could possibly be implemented in Belgian police services. With regard to the implementation, many respondents raised concerns about the willingness and ability of personnel to work with such systems. Raising the organisational acceptance and enthusiasm of individuals would be essential to be able to implement predictive policing. A concern that was also raised around this is that the Belgian police has a large population that is close

to retirement age, meaning that they are not digital natives. Respondent 6 stresses that the impact of this on the potential implementation of such a system cannot be underestimated.

"We have an aging organisation, between now and five years more than one-third of police personnel are slated to retire. We must not underestimate the impact of this. Some individuals who are closer to their retirement are digitally illiterate" (Respondent 6).

Aside from the concerns raised above, respondents also address that the Belgian police have difficulties attracting IT specialists as the pay is significantly higher in the private sector. This would make it harder for police to be able to develop their own predictive policing system without help from outside of the organisation. There would also be a need to sufficiently educate existing and new police officers on how to work with a given technology as not everyone within the organisation is equally familiar with digital technologies.

"Software must be accessible for personnel, as not everyone is equally good with computers. Integrating such technologies in the Belgian police should be achieved, first of all through training courses and through attracting the right profiles from the job market" (Respondent 8).

Future

We asked the respondents whether predictive policing might spread from other countries to Belgium since neighbouring countries are already working on pilot projects. In general, we can conclude that most respondents have a positive feeling about the future of predictive policing, but there are several conditions it will have to meet. First of all, the system will have to prove itself in terms of effectiveness. There are many people of the principle: see first and believe later. The system will first have to make its results known in the Netherlands before budgets will be released in Belgium. Recently a number of pilot projects were underway to see what it could mean. A respondent also recently looked at how it was evolving. He noticed that there was a lot of wishful thinking. The emergence of the coronavirus also caused a delay. *"I also think that after Covid19, we will regain momentum, and the studies will resume"* according to one respondent.

One person indicated that predictive policing has actually been applied within the police for a long time, but without the use of additional tools like software. Its use or application is done purely on the basis of analyzing existing data on certain criminal facts and based on that, drawing up a plan of action for this phenomenon. This can also be seen in the "black points" or predefined nuisance spots, traffic axes, and also how the priorities within the Zonal Security Plan are set: based on existing crime figures, a prediction can be made about the phenomena in the next 4-5 years. The current commissioner general, Marc De Mesmaeker, is already a proponent of technological progress, which is an important factor in the future. So, predictive policing will certainly be taken into account in the future picture of society.

When asked whether investments are already planned for the introduction of predictive policing, nobody could give a concrete answer. The final decision lies with the Minister of the Interior Annelies Verlinden and the Minister of Justice Vincent Van Quickenborne to determine whether there is a budget available for the system. It is true that various police departments have planned investments, as far as information management is concerned. Throughout the last few years, and the coming years, an annual budget has been released for innovations in the area of technology, such as camera security, ANPR, cell phones, bodycams, etc. That represents added value for the work field. Investing in high-quality training is also part of the budget. It is not only about the fact that investments have to be made on a materialistic level, of course, but the staff also has to be sufficiently trained to be able to work with the technologies. In this way, technology can add value to the staff so that they can work more efficiently, more safely or better,

taking into account the investment because it comes from society, and must be responsible to the population as such.

"At the moment, it is a more important investment for police departments to invest in personnel. It is necessary to make the profession attractive again among the population. So I see more chance of investing in this at the moment. It is very difficult nowadays to attract IT specialists to the police force, which is necessary when working on predictive policing. The challenge of the future is not so much innovation but how do we as a police department get new people into our services" (Respondent 9).

A respondent indicated that predictive policing consists of 4 major factors, being the: feeding-gathering-processing-finding of the data, analysis of the data, good ICT infrastructure, and the briefing/dissemination of the information or data. It's not just the investment of the system, it's the overall picture. The hiring of appropriate personnel, who can process the data, and the reporting of the data to the wider public is a difficult process. In this way, there is much more involved than just the investment of the system. Other departments indicate that such investments in the field of information governance are certainly on the agenda. These are also formulated in general terms and will not apply specifically to predictive policing. It is a matter of waiting to see the results from neighbouring countries before making investments ourselves.

The majority of the key figures indicate that hotspot prediction could be an added value if such systems were implemented as predictive policing. The reason is that perpetrator prediction and victim prediction is more difficult to implement in Belgium and is therefore kept to the side. It is indicated that perpetrator prediction could mainly be used to fight terrorism. Also for victim prediction, it is stated that the privacy legislation within Belgium is not yet developed enough to introduce such systems. Furthermore, it is indicated that it depends on the phenomenon, how the approach and the application of the software will be carried out. This has a direct impact on the added value you can realize. You could also work in combinations, it all depends on the phenomena. Above all, it has to be framed within the policy, what is the added value and the quality of the predictions.

According to the interviewed respondents, there is no concrete reason why they have not yet started with predictive policing. People are aware that there have been pilot projects to introduce it, but nobody is clear about the situation at the moment. A general look at the interviews shows that within Belgium people are mainly waiting for the results from other countries. We notice that there is interest in how predictive policing is doing in the Netherlands under the CAS system. If we were to receive positive results from our neighbours in the north, we think this would mean a lot to how we would handle it. The financial picture is also a slight limit that people may not dare to cross. The fact that we have to start spending a certain amount of money on a system that has not yet proven to be effective keeps people from purchasing it.

In recent years, major changes have been noticeable in terms of technological advances. It started roughly after the 2001 police reform. It is since the 2016 attacks that everything has gained even more momentum. Police departments have a software package available through a partnership with Microsoft, Office 365. Also, since the corona crisis, work at home has emerged, increasing the use of teams and other digital programs. This gives people access to share information digitally, in a secure way. It goes without saying that this evolution will continue in the coming years. People are less enthusiastic about the future of predictive policing in this picture. This application is more difficult in practice than in theory. First of all, the dangers of the system must be clearly analysed: side effects, displacement effects, contra from the criminal environment, the danger of over-policing, stereotypes, and the self-fulfilling prophecy. Only when this has been clearly formulated can the system be used. Then it could possibly be used in the future. The trade-off between local and federal police is also not always simultaneous. In principle, the local police can react more quickly to changes within the service, or deal with other hierarchies. It

also depends very much on the local zone itself and its resources. To roll out national systems there are often delays due to market procedures related to large budgets and technically more challenges to roll out systems on a large scale.

Ethical and legal aspects

The line between legitimate data collection and privacy violation is a difficult one. Every zone, therefore, has a data protection officer or DPO for short. This person is responsible for the protection of personal data by checking whether everything complies with the GDPR requirements. In a compelling ministerial circular called the MFO3, it is determined where the boundary lies in relation to data collection. In the case of predictive policing, legislation can be found in the special investigation method or BoM (Bijzonder opsporings Methode), but this must pass through the investigating judge. A complete framework does not yet exist. The political climate and the competent ministers also have a great influence in determining this boundary. If predictive policing were to be used in Belgium, the legislation would also have to be supplemented. Each police officer also has professional secrecy and must follow the law of the police office.

To ensure that the police meet these conditions, there are various control authorities. The COC can perform quality control checks to ensure that all information collected meets the legal requirements. An expansion in the COC will be necessary once a decision is made to engage in predictive policing in Belgium. This will be necessary to check all applications of predictive policing. Besides this, there is also Comité P and the General Inspection (AIG). Comité P investigates complaints that indicate organizational or structural dysfunction, and the General Inspection (AIG) aims to improve the functioning of the federal and local police.

To determine the ethical boundary, the GDPR and LED implemented in the law on the police profession is the basis. The laws around privacy are sufficiently strict and even sometimes a bit too strict in the context of policing. Sometimes there is too much protection so this can hold back police work. People often look negatively at the collection of data by a government despite it being used for the safety of society. It is also important to test a lot and impose conditions when developing algorithms, it would not be bad to make a law around this. The code of ethics was written in 2006 and predictive policing did not exist then. It does contain general matters such as that you should be cautious with the resources that are given to you.

Some respondents think differently about this. There are also applications within the police force that violate privacy, such as curfew checks via ANPR cameras. After the terrorist attacks in Belgium, there have also been very drastic steps taken regarding privacy that have not been given sufficient consideration. Privacy is currently in many cases released under the motto "if you have nothing to hide you have nothing to fear". This is a hollow argument. Sometimes the regulations are only looked at after a mistake.

Concerns

The topic concerns around the topic of predictive policing is divided into several sub-questions to which the respondents were subjected. To begin, we asked the respondents the possible benefits of predictive policing, which they believe are individually applicable to the topic. From the analysis of the results of the survey, several key figures indicated that efficiency and effectiveness of data processing is a huge advantage when using the system. 'Implementation of such systems also means a shift in priorities' said one respondent. 'The fact that we are losing less time in making incredible amounts of data manageable, allowing computer systems and AI to do this much faster and more efficiently is definitely an added value. The fact that you have the right people in the right place with the right equipment can also contribute to greater safety in society,' says respondent 4.

"That we can prevent a murder, so to speak, this is of course the pinnacle. If we can prevent fewer thefts or other crimes, this is of course a positive development that can only be encouraged" (Respondent 5).

When we focus on the disadvantages of predictive policing according to our key figures, we can conclude the following. In some interviews we were told that there is a danger in ethnic profiling and discrimination of persons in perpetrator prediction, for example. Also, the input of the data in the database brings a certain danger, if these are things that the police themselves are going to collect about individuals this can be done with a certain bias, so it does not remain objective. With dark numbers we must take into account that not all data will be complete some cases will not be reported. The technological changes we face within society in recent years continue uninterrupted. Keeping our staff up to date is therefore a danger that we must take into account. We need to make sure that our older personnel do not struggle with this. Attention to classic police work and common sense should be kept in mind. These issues can be avoided on the one hand by organizing active training on a regular basis for the staff. It is felt that classic police work should not be forgotten when we let the machine do the work instead of the human. We notice that there is a certain ignorance of the unknown: People don't really know how it works, and to a lesser extent are aware that systems like predictive policing are tools to complement and improve policing.

"It is very difficult to make it clear to services that one will patrol somewhere based on a computerized recommendation when one may know from one's own experience that it is not necessary within a certain neighbourhood" (Respondent 9).

As for the willingness of police personnel to get started with predictive policing, opinions are somewhat defined along the same lines. It is argued that the system will first have to prove itself, and produce results, before there will be a high readiness among personnel. "If the system works well, there will be a higher willingness versus poorer functioning where that will lower willingness." Several key people think it is important to provide training around the topic, and not make it seem like an extra burden but effectively show that there are benefits and that some things will be easier. Training within smaller groups with instructional videos that can be re-watched can be a possible tool to address it educationally. We need to be aware that it will mean additional training for police officers, where effective results will need to be demonstrated to increase readiness for staff.

"The added value that predictive policing can bring will not immediately be an added value for the police personnel themselves but rather for society. Prediction and the human component must go hand in hand. One should not replace the other, it should be complementary" (Respondent 3).

The degree of acceptance by citizens coincides to some extent with the willingness of police forces to implement such systems. First of all, the emphasis is on sensitization. For this, the population must be adequately informed of positive points that predictive policing will have to deal with. From the beginning its use should be clearly defined, what it means for people's privacy. If a (controversial) article were to be drafted, a social and therefore political debate would immediately arise. The danger of this is that it will immediately be decided that nothing will happen with it. This can be a danger when there is poor communication or insufficient contextualization about the intent and possibilities of the system from the beginning. It will be the role of the police to highlight the positive aspects/results during communication. The context towards a safer society is also important to mention here. A bottleneck we have to deal with is the cooperation with private partners: think of telephone operators such as Proximus, Telenet,.... As well as container firms that may or may not transport overseas, and in this way are an opportunity for transmigrants. The problem in dealing with such problems is that private actors will not readily share data with government/police. This is because they could potentially lose time or lose the data to competitors. They remain outside the debate, against the public interest. Another bottleneck that has been encountered in recent years is that the level of trust of the population in police services is currently too low to implement such systems. Police forces need to be able to get back closer to the population in a positive way.

"We had to deal with La Boum 1, 2 and 3, where a clear signal was sent out by the population. This signal is not only to the government, it is also directed to the police officers. It is a form of protest with meaning: we do not agree with how we are treated. Trust must therefore be rebuilt through the interaction between citizens and police officers. People only know policemen in the way of alcohol checks, drug checks, speed checks, etc. In which the perception is actually focused on negative aspects within the police" (Respondent 2).

Quantitative research

Plan of action

Who?

Before starting our data collection, we had a target sample of 382 respondents from approximately 48.600 employees (Politie in België, 2021) within the Belgian police. This was drawn up with an error margin of 5% and a reliability level of 95%. Reliability measures the repeatability of the results. If another researcher carries out a similar study with similar respondents, he/she should obtain similar results. In addition, a higher reliability level also guarantees that the research is not based on random results and is free from random errors. Random errors in a survey can occur in various forms, such as the input of a wrong or unclear answer by the respondent. With the term margin of error, we mean that we give ourselves a 5% leeway in which our results would be inaccurate. In other words, the degree of uncertainty of our sample results. Due to a lack of resources and mainly time, we ended up with 73 respondents, entirely by means of an online survey. Our survey will not be representative since we did not reach the required sample size of 382 respondents. With 73 respondents who participated in our survey, we came to a margin of error of 11%. This will have consequences for the accuracy of our statements compared to the general population (the Belgian police). In our case, the margin of error has increased by 6%, which increases the margin or slack on which our results would be inaccurate.

How & what?

Due to the large size of our sample, we used a method that would give us a lot of freedom in the approach of our quantitative research. Therefore, we utilized a non-theoretical select sample and the so-called "Random sample". Within this type of sample, the respondents are randomly chosen at a random place at a random time. In our research, the random choice of respondents started through an internship list that was presented to us by our mentor. This list consisted of 12 police officers that are internship mentors within our study field of "Societal Safety". In this list, we also could find some of their personal information such as name and email address.

Further, we completed our list by visiting the website of the Belgian Federal police, where we found the phone numbers of police officers employed within the Local and the Federal police. As our target audience was pretty broad, we tried to contact police officers from different units and to gather as many different insights as possible. The website of the Federal police helped us to expand our initial list to 29 potential respondents. These persons were contacted regarding our surveys, but also the interviews.

The last step of the "gathering of respondents" consisted of consulting Wikipedia in order to get a better overview of all the police districts in Belgium. Then we randomly selected five police districts from five different provinces (e.g. West-Flanders, East-Flanders, Limburg, Antwerp & Leuven). The size of the police district did not really matter, as we wanted to present an objective point of view of the different Belgian police forces/units. Further, we used the service of 'De Sociale Kaart' in order to get the contact details of each police district.

The disadvantage of this is that not everyone has an equal chance to be selected to participate in the research. Knowing this information, we choose to use this approach and try to maximize our results.

Data collection

For the data collection, we decided to only make use of online surveys. The surveys were created in Google Forms and were distributed via e-mail to the selected units of our operational population. With this approach, we estimated to have a greater chance of response and the surveys would be more accessible for our audience. The data collection was spread over two weeks and we made multiple attempts to contact as many police departments as possible.

Basic information

Our survey includes 73 respondents. 54 or 74% of the respondents identify themselves as male, 16 or 21,9% of the respondents identify themselves as female and 3 or 4,1% of the respondents do not identify themselves as male or female (Figure 8).

Since the greater majority of our respondents are working within the local police (will be touched on later), we consulted the state statistics of gender within the local police for comparison. As already known, most of the local police are males represented by 66%, while females represent only 34%. Compared to our findings we can clearly see the similarity that the majority is male, however, the ratio deviates a bit, where in our case males are overrepresented while females are underrepresented by a small margin.
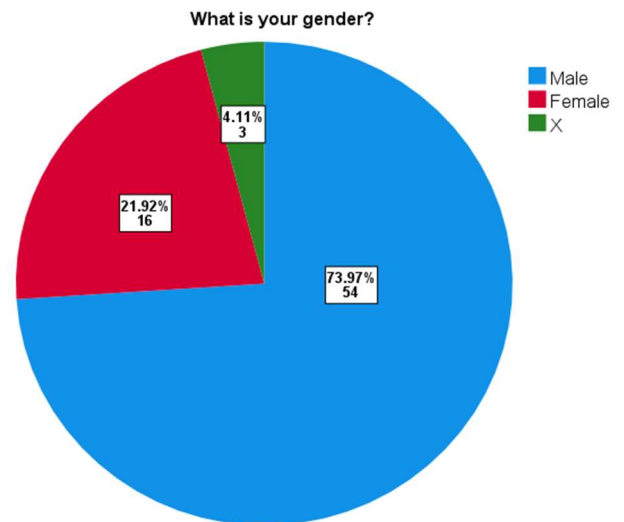
Figure 8: Pie chart of the answers related to the question "What is your gender?"

31/12/2019	Mannen / Hommes	Vrouwen / Femmes	Totaal / Total
OPS	21 778	7 518	29 296
CaLog	1 757	4 656	6 413
Totaal / Total	23 535	12 174	35 709

Figure 9 Table about the numbers of employees within the Belgian Local police (Source: Federale Politie, 2019)

For the ages of the respondents, we decided to divide the ages into classes of 10 years (Figure 10). We notice that the ages are well distributed. There is a nice spread of ages and the ratio for both the younger respondents and the older ones is good. The largest group of respondents is between 40 and 49 years old, which is represented by 24 respondents or 32,88% of the total respondents. It is closely followed by the group aged between 30 and 39 years old, which is represented by 23 respondents or 31,51% of the total respondents. These 2 groups together account for more than half of the respondents namely 47 or 64.39% of the total respondents. The other classes are 20 to 29 years old which is represented by 10,96% of the respondents and 50 to 59 years old which is represented by 24,66% of the respondents.

Figure 10: Histogram of the answers related to the question "What is your age"

If we look at the results where we asked, where the respondents work (local or federal police)? We notice that the majority of our respondents work within the local police of Belgium. Only 3 respondents or 4,1 percent of the respondents work in the federal police (Figure 11).
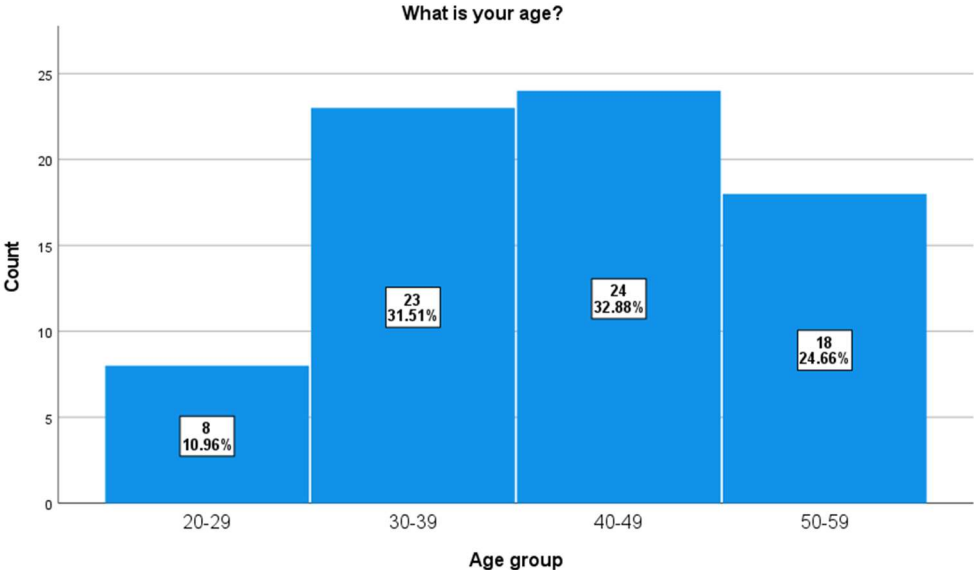
Do you work within the federal or local police?

	Quantity	Percentage
Federal police	3	4.1
Local police	70	95.9
Total	73	100.0

Figure 11: Table about the answers related to the question "Do you work within the Federal or Local police?"

With this question, we wanted to know what the positions or ranks were of our respondents. As we can see on the graph (Figure 12) the largest part or 47.95% of our respondents were police officers of the base-level (basiskader). The police officers at the base-level are police inspectors. As an inspector, you have full police powers but not often in a position of leadership. The second-largest group of respondents with approximately 37% is the middle-level (middenkader). These staff members have full police powers and also have managerial duties. They manage inspectors and police agents in smaller teams (jobpol.be). Subsequently, we have the officer level (officierenkader) with 9.59% or 7 of our respondents. These staff members have full police powers and distinct managerial responsibilities as commissioners. They take on the management of staff members in larger teams or entities (jobpol.be). Finally, we have the auxiliary staff members (hulpkader), they do not have full police powers and help on all kinds of levels within the police. This was our smallest group with only 4 respondents of the 73.
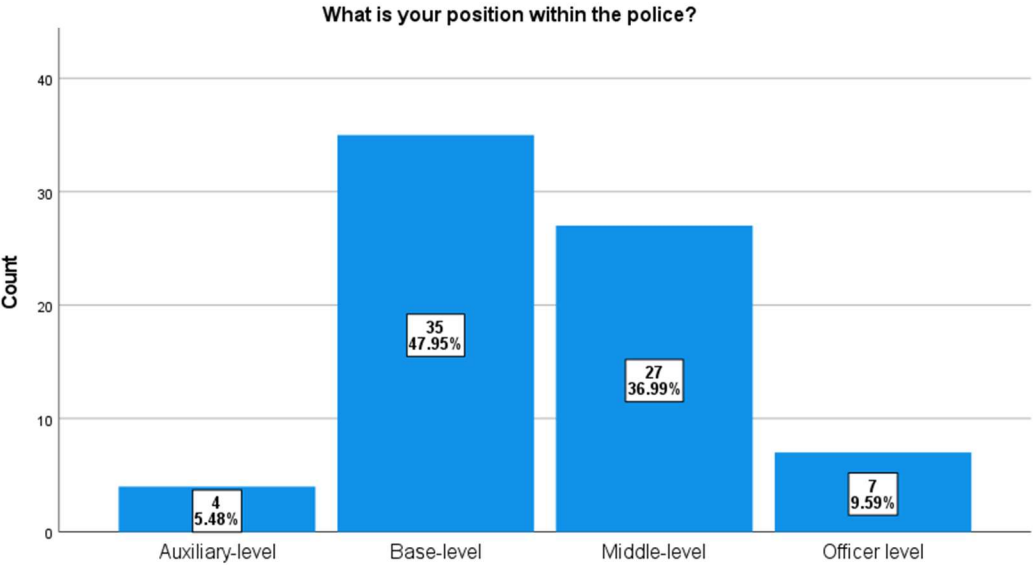

Figure 12: Graph about the answers related to the question "What is your position within the police?"

Technologies & Predictive Policing

Does you police department use 'modern' technologies? (e.g. AI, smart cameras, ANPR, robots, mobile apps, etc.)
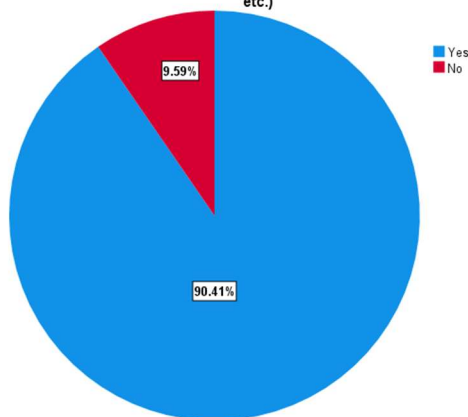

Figure 13: Pie chart regarding the use of "modern technologies" within the Belgian police

Here (Figure 13) we asked whether the police department of the respondent uses 'modern' technologies. Under this we understand technologies such as AI, smart cameras, ANPR systems, robots etc. Only a small part of our respondents (9.59%) claimed that their department does not use 'modern' technologies. As this question does not offer a clear response on the matter, we decided to add an open section to this question. The moment we look at all the different submitted answers one thing is noticed immediately. With a few exceptions, every respondent said that ANPR is used within their department. The second biggest item that kept showing up in the answers was the mobile application 'FOCUS' (application with access to all sorts of data and various databases).

Another thing we wanted to know with this survey was if people within the police knew or had heard of predictive policing. To our surprise more than half our respondents or 54.79% of them hadn't heard of predictive policing prior to our survey (Figure 14).

Had you heard of predictive policing before taking this survey?
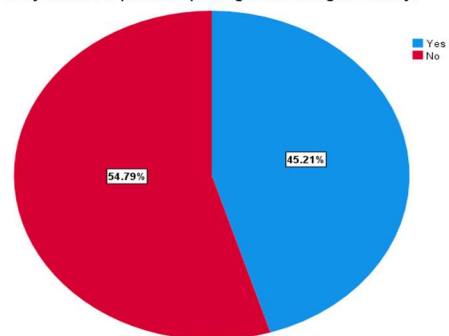
Figure 14: Pie chart about the answers related to the question "Had you heard of predictive policing before this survey?"

Have you already dealt with predictive policing within your department?
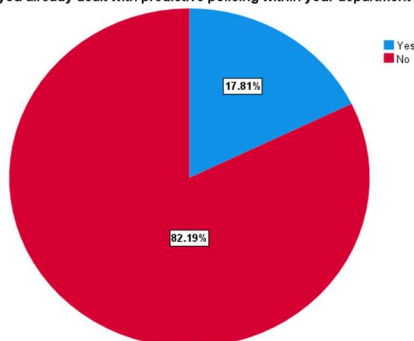
Figure 15 Pie chart about the answers related to the question "Have you already dealt with predictive policing within your department?"

Following this, we asked if the respondent had ever dealt with predictive policing within their department. We concluded that 17,81% of the respondents had dealt with predictive analytics within their department (Figure 15). To clarify these answers, we asked once again for more elaborated explanations using an open question. The main recurring theme was the fact that they use predictive policing but in the broader sense of the word. They manually use older data to create hotspot predictions. In some instances, use of predictive policing was a priority within their policy plans. One respondent helped an intern do a study on the matter.

Viewpoints

Our next analysis is about the preference of our respondents about the type of predictive policing software, which they think would be most useful in their context of work (Figure 16). For this question, our respondents had the possibility to choose multiple answers.

As presented in the chart, hotspot prediction has the highest number of responses (56). Followed by perpetrator prediction (37) and victim prediction (27). On the other hand, a small part of our respondents (13) shares the opinion that none of the named predictive policing software could be useful in their field of work.

Within the concept of predictive policing, which type do you see as useful in your work?
(multiple responses possible)

73 responses
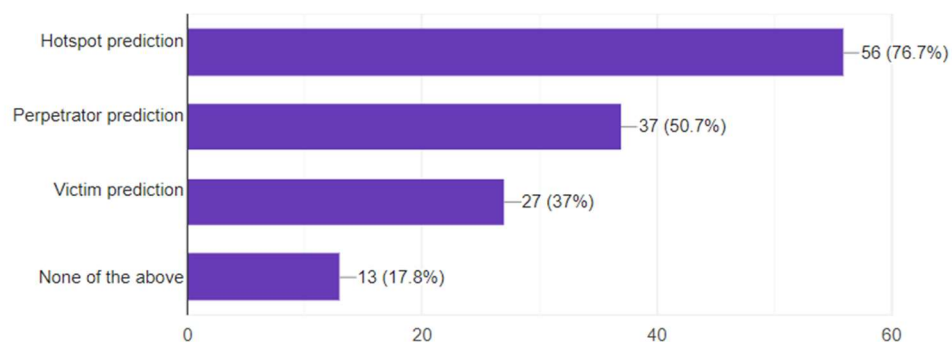
Figure 16: Bar chart regarding the type of predictive policing that our respondents find most useful

The fact that hotspot prediction is seen as the most useful form of predictive policing is not surprising. In some of our interviews, the police officers shared that within their department, they already make use of a less advanced, more primitive form of hotspot prediction. In order to predict or make an assumption about the possible location where a crime can occur, the officers rely on pre-existing data, but instead of the data to be analyzed and arranged by algorithms (AI), it is done by a human analyst. This can explain the emphasis on hotspot prediction/ hotspot predictive policing software.

In our survey, we also gave the opportunity to our respondents to motivate their choice(s). Firstly, we created a crosstab that would represent all the answers to this question, but the output of the crosstab was not aesthetically pleasing and also not easy to interpret. Therefore, the analysis of the answers was done manually through Google Spreadsheets, as the answers to the question and the motivation for their choice(s) were consecutively located.

A short summary of our respondent's motivation for their particular choice:

- *Hotspot prediction*: In the majority of the answers regarding hotspot prediction, our respondents mentioned the possibility of a more proactive approach towards crime and also an improved way of directing the different police units. Our respondents also see the possibility to improve their efficiency by possibly executing more targeted patrols/interventions.

- *Perpetrator prediction*: For this approach, the most relevant application was mentioned in the context of the possible prevention within the right audiences (referring to the criminal environment).

- *Victim prediction:* For the last approach within predictive policing was mentioned the possibility of a more proactive approach towards the population. Further, the possibility to predict who the victim may be could lead to the perpetrator.

- *None of the above:* According to our respondents that choose this section, the number of applications that shift the focus from the "real police work" is increasing, therefore they do not think those applications could be useful. Further, one of the respondents mentioned that each case is different and should get the right approach.

We also investigated if our sample of 73 employees within the Belgian police consider predictive policing as a possible application in their own line of work. According to the table (Figure 17), 82,2% (60) of our respondents see a possible application of predictive policing. On the other hand, 17,8% (13) do not see a possible application for predictive policing within their own life of work. The results of

Within my own line of work, including all the pros and cons, I see possible applications for predictive policing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	60	82.2	82.2	82.2
	No	13	17.8	17.8	100.0
	Total	73	100.0	100.0	

Figure 17: Table about the possible application of predictive policing within our respondent's line of work

this question are not expected, as the possible pros of predictive policing software are frequently undermined, and it is much or less an unknown matter.

When looking at the previous question we wondered if the function of our respondents within the Belgian police was associated with whether they see applications for predictive policing. We wanted to know **if there is a link between the function of our respondents and whether or not they see possible applications for predictive policing**

Kruskal-Wallis Test

	What is your position within the police?	N	Mean Rank
Within my own line of work, including all the pros and cons, I see possible applications for predictive policing.	Auxiliary-level	4	43.50
	Base-level	35	35.16
	Middle-level	27	38.09
	Officer level	7	38.29
	Total	73	

Figure 18: Crosstab about a possible link between rank and the application of predictive policing

within their own line of work. To get the answer to this we used a Kruskal-Wallis test to look for a link between their position and the question mentioned above. If we look at (figure 18) we can see that respondents belonging to the auxiliary-level are the ones that most often see possible applications for predictive policing within their line of work. The middle-level and officer-level have approximately the same opinion on the matter within our research at more or less 38. The group that see the least applications within their line of work are the respondents of the base-level with a mean rank of 35.15. These findings seem logical because what often came out as a positive point of predictive policing in our interviews, is the fact that it would mainly help with administration and the processing of data.

These observations seem logical but are they significant? When we look at the significance of these findings, we see that this is 64.2% (Figure 19). From this, we can conclude that our results are based too much on coincidence since the significance is higher than 5%. We can therefore conclude that there is no significant link between the position of our respondents and whether or not they see possible applications for predictive policing within their own line of work.

Test Statistics[a,b]

	Within my own line of work, including all the pros and cons...
Kruskal-Wallis H	1.678
df	3
Significance	.642

Figure 19: Significance test about the outcome of the conclusion to the possible link between the rank within the police and the application of predictive policing

In (figure 20), we present the grade of preparation to be involved in procedures of predictive policing. The majority of our respondents (48) indicated a willingness to be involved in procedures that rely on predictive policing software. On the other hand, 25 of the employees within the Belgian police are not prepared to be involved in such procedures. We emphasize that this chart applies only to our 73 respondents and by any means should not be generalised to all the police officers in Belgium. The "real number" of officers who are prepared to be involved in predictive policing procedures within the Belgian police may lie higher or lower.

Are you prepared to be involved in procedures that rely on predictive policing?
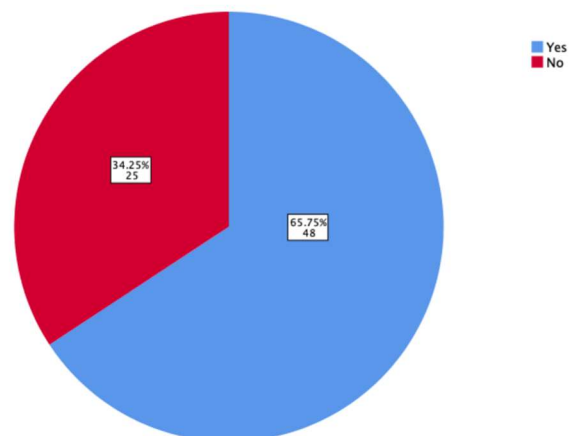
- Yes
- No

34.25% 25

65.75% 48

Figure 20: Pie chart of the answers related to the question "Are you prepared to be involved in procedures that rely on predictive policing?"

When we saw this data, we were wondering if the older respondents are more or less prepared to be deployed in procedures where predictive policing is used. We wanted to know **if there is a link between the age of our respondents and whether or not they are prepared to be involved in procedures that rely on predictive policing.** To get the answer to this we used a Kruskal-Wallis test to look for a link between age group and the question mentioned above. If we look at (figure 21) we can see that the youngest age group of 20–29-year-olds are prepared the

Kruskal-Wallis Test

Ranks

	Age group	N	Mean Rank
Are you prepared to be involved in procedures that rely on predictive policing?	20-29	8	44.94
	30-39	23	36.80
	40-49	24	37.33
	50-59	18	33.28
	Total	73	

Figure 21: Crosstab about a possible link between the age of our respondents and the preparedness to be involved in procedures that rely on predictive policing.

most to be deployed within a program of predictive policing. The age group that is the least prepared to do this is the oldest age group of 50–59-year-olds with a mean rank of 33.28. Between the two, the respondents between 30 and 59 years have more or less the same mean rank. They have approximately the same preparedness to being deployed in procedures that rely on predictive analytics.

This is a very interesting observation but is it significant? When we look at the significance of these findings, we see that this is 47.7% (Figure 22). From this we can conclude that our results are based too much on coincidence since the significance is higher than 5%. We can therefore conclude that there is no significant link between age groups and whether or not they are prepared to be involved in procedures that rely on predictive policing.

Test Statistics[a,b]

	Are you prepared to be involved in procedures that rely on predictive policing?
Kruskal-Wallis H	2.489
df	3
Significance	.477

Figure 22: Significance test about the outcome of the possible link between age and preparedness to be involved in procedures that rely on predictive policing.

In (figure 23), we have a statistic that makes it possible to see the distribution of the answers regarding the possible objections or challenges within predictive policing. The spread in answers is more even than anticipated, as 57,5% (42) of our respondents answered with "Yes" and 42,5% (31) answered with "No".

Do you see any objections or challenges around the use of predictive policing?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	42	57.5	57.5	57.5
	No	31	42.5	42.5	100.0
	Total	73	100.0	100.0	

Figure 23: Table about the answers related to the question "Do you see any objections or challenges around the use of predictive policing?"

In our survey, the question "*Do you see any objections or challenges around the use of predictive policing*" was followed by a part where the respondents who answered with "Yes" had the possibility to motivate their answer. As the motivation of their answer was an open question, we can not present any comprehensive statistics because most of the 42 answers differ from each other. Therefore, we manually analysed the answers regarding the motivation for their answer and made a recap of their statements.

- **Objections**: A lot of the answers of our respondents were data related. They mentioned the fact that the predictions or the outcome of predictive policing is very much dependent on the input and therefore it can't be a reliable source of information. Of course, the reliability is also dependent on the type of data that has been used and this was also mentioned by our audience. Further, the use of outdated data could be an issue, as some people could be falsely targeted and also the predictive policing software could give the police officers a false sense of knowledge. Our respondents also mentioned the possible objections in terms of privacy and the legislation. The most common comment was made about the GDPR and how predictive policing software can be situated within the context of policing without endangering the individual freedoms of the citizens. The last type of comments that were mentioned were about the ethics of predictive policing software. Related to this topic our respondents mentioned some of their objections for example self-fulfilling prophecy, prejudices, ethnic profiling, discrimination, tunnel vision, etc.

- **Challenges**: According to our audience one of the biggest challenges would be the evaluation of predictive policing software and finding the added value of it. Another possible challenge that was mentioned was related to the personnel and how smaller police districts could struggle with the deployment of their staff/units. This could make the application of predictive policing software only applicable within the bigger police districts. Related to this topic our respondents also mentioned that if this technology would be utilized the police officers could have more administrative tasks and their presence in the streets would diminish. Further, some of our respondents mentioned that organised crime is much more difficult to predict than the average criminal.

At the end of our online survey, we gave our audience the possibility to leave a remark behind. The majority of the comments were related to our topic and also best of wishes regarding our thesis. But there were also two statements that caught our eye and are worth mentioning.

"The GDPR is not an obstacle but a means to develop technical tools that are privacy-proof."
(Respondent 19)

"As in most police districts, there is too little capacity within our district to start up and follow up such projects." (Respondent 42)

Report of findings

Qualitative Research

As far as our qualitative research is concerned, we can conclude that the technological infrastructure within the Belgian police is not quite ready to work with systems such as predictive policing. The unequal funding between the different branches could be a problem. Our research has shown that at the federal level it will be more difficult to purchase systems such as predictive policing than at the local level. This is because of the differences in how local and federal police are governed and funded. Some local areas also have more resources than others. Here there is a risk of technological fragmentation. The local and federal police also use different basic software systems. For the local police it is the ISLP and for the federal Fides. These systems are compatible with each other but a centralized system to fully utilize both software programs does not yet exist. Plans have been made for this in the future, namely the 'I-police' project.

Our respondents also mentioned that the lack of research and results are keeping the police from using such systems. First there must be enough evidence that predictive policing works before moving on to the next steps. The readiness within the staff to work with such systems is also an important factor. Some of our respondents mentioned that there is a large population that is close to retirement. For these people who are not digital natives, it can be a challenge to start working with new digital technologies. Finally, our research showcased that the Belgian police are having trouble recruiting IT personnel. This would make it more difficult for the Belgian police to roll out systems such as predictive policing.

According to some key figures, the legal framework for predictive policing is sufficient only if the necessary additions are made regarding such systems. Additionally, an expansion of the control bodies such as the COC will be necessary to verify all different applications of predictive policing. To determine the ethical boundaries various key figures referred to the GDPR and the LED as their main source. These 2 legislations are intertwined within the Belgian law on the police profession.

Quantitative research

For quantitative research we can conclude the following. When we look at the theme of "Technologies & Predictive Policing" from our survey we see that the vast majority uses 'modern technologies'. Under this we understand technologies such as AI, smart cameras, ANPR systems, robots etc. Over half of our respondents had never heard of predictive policing and less than a fifth had actually dealt with predictive policing, this in the broad term. For the viewpoints and opinions of our respondents we noticed that hotspot prediction tools were the clear favourite, ¾ of our respondents said they saw it as useful within their line of work. Perpetrator prediction tools followed, and the least favourite were victim prediction tools. Almost a fifth of the police personnel who filled out our survey or 17.8% of them didn't see any of the predictive policing tools as useful within their line of work.

This means that the large majority or 82,2% of our respondents said they did see possible uses for such tools within their line of work. We tried looking for a link between this and the rank of our respondents. A difference was observed between the ranks, namely that the base-level saw the least applications within their line of work compared to all other ranks. These findings seem logical because what often came out as a positive point of predictive policing in our interviews, is the fact that it would mainly help with administration and the processing of data. However, these observed differences were not significant because of our small sample size.

A noticeable majority of our respondents or 65.8% of them said that they would be prepared to be involved in procedures that rely on predictive policing software. The willingness to work with and around these tools is somewhat there within our research. We tried to see if there was a link between this topic and the age of the respondents. We noticed that the older our respondents were, the less willing they were to be involved in procedures that rely on predictive policing software. These results are in line with our qualitative research where it was also mentioned that there are many older people in the police. Although once again this observed difference in our research is not significant and based too much on coincidence.

Finally, we noticed that the majority or 57.5% of our respondents said they saw objections or challenges around the use of predictive policing. The main things that were mentioned was the tool was very dependent on old data for the input and that it would not make the output very reliable. Another common aspect that was mentioned was the fact that GDPR must be taken into account. A final thing that was recurrent was the fact that they were not sure about the usefulness of such tools in smaller police departments with less resources.

Conclusion

"Is there an interest among Belgian Police services to use predictive analytics as a tool in policing, taking into account the legal, ethical, and practical aspects?"

To answer this question, we will look at the two sides of our research, but we will mainly focus on the qualitative side. We believe that our interviews provided more useful and interesting information on the topic than our surveys. Partly because of how our survey is formed and the lack of response. The key figures we interviewed knew these systems well and were aware of recent developments. This means they were also aware of the different concerns and challenges regarding predictive policing. Most of our key figures mentioned the fact that technological infrastructure as well as the internal culture is not quite ready to work with predictive policing. Resources would have to be allocated towards these two aspects. Our interviewees then mentioned that this could change once concrete positive results are presented regarding the use of predictive policing systems. Regarding the legal aspect they mentioned that the current framework would suffice with the necessary adjustments. Similar to changes we have seen before regarding other technologies (ANPR, body cameras etc.). When looking at our surveys we can say that our respondents did see possible uses for predictive policing within their work. Two thirds of them were willing to be involved in procedures relying on predictive policing. Even though the majority was willing to work with such systems they were still aware of challenges that come along with it.

From our research we can conclude that there is an interest but rather in the sense of researching it from a distance and wondering if it would be a good implementation. In general, the Belgian police are waiting for concrete positive results before making the investments to implement such technologies. Their priorities lie elsewhere at this moment.

Advice

Our advice in terms of the use of predictive policing software by the Belgian police is constructed on the basis of our quantitative and qualitative research and partially on our literature study. We have constructed our opinion by using the information from our literature review and our research. The opinion is certainly not binding but it does provide our personal view on what we consider important. We made an infographic which you can find below.

Please, bear in mind that this is our own opinion about how predictive policing could be integrated. Although we based our advice on the available literature and our qualitative and quantitative research, there is a lot more to discover about this topic. Once again, we would like to point out that our thesis could be the base of a further research.

Lyuben Antonov, Michiel Laleman, Quentin Planckaert, Deny Shabouev, Cedric Uyttenhove, Alexander Vermeire

IMPLEMENTING PREDICTIVE POLICING IN THE BELGIAN POLICE

INFOGRAPHIC

Vives University College Applied Social Studies

1. Create a knowledge base within the Belgian police

Provide training around the topic, both theoretical and practical, emphasizing both the positives and the possible flaws of predictive policing.

2. Is it necessary?

Depending on the scale of the police department and their resources, demographics, crime rates etc. each department should decide on their own whether it is necessary to implement predictive policing software within their work field.

3. Clear vision

Each police department that is interested in the utilization of predictive policing software should have a clear vision of their "Plan of action". Therewithin lies the emphasis on choosing which type of crime to combat, how the data-gathering process and the analysis will take place, and their general approach or "Way of working".

4. Take costs into account

According to our sources, the estimated cost of the predictive policing software lies between €50.000 - €80.000 per year.

5. Clear communication

We would like to point out the importance of clear communication towards Belgian citizens. They should be timely informed about the intentions behind the use of the predictive policing software and which data they would use for the predictions. The importance of clear communication within the police department should not be undermined. We suggest that all important matters in connection with predictive policing should be mentioned during the "daily briefing" of each of the shifts.
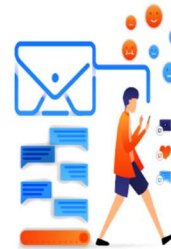
6. Which type of software

The choice between the different types of software e.g. hotspot-perpetrator-victim prediction is crucial and should align with the needs of the police department. Each type of software has its unique challenges. It is important to know how these systems work in order to work correctly with them. The data input is very important in order to have a reliable output.

7. Use non-personally identifiable data

Limit the input to data about the type of crime, the place of the crime and the time of the crime. This way privacy and ethical concerns can be held to the minimum.

8. Suitable personnel

Utilizing predictive policing software is more than just the purchase of the software. Any given police department should also hire new people or train their current personnel in terms of the data-gathering and the data-analyzing processes. The monitoring of the input-output is also a crucial task that could be done by the current LIK (lokaal informatie kruispunt) or any other suitable personnel.

9. Continuous evaluation of the software

The evaluation of the software should be a continuous process, as, during the utilization, the approach can be refined. It is also important to know if there are any problems and how they can be avoided in the future.

10. Databases

Are the current databases sufficient enough to support predictive policing? The databases should be frequently updated, as the correctness of the data plays a big role in the use of predictive policing software. According to our sources, it is also important to not include data that dates back more than five years ago. This could undermine the correctness of the output.

Use the following QR-code to find our introductory video on predictive policing and our full research report in the video description

Critical reflection

During our intense eight-week period we tried to create a complete and correct thesis. Even though we all did our best, mistakes are bound to happen. At the end of our research, we had a complete image of what we had achieved. There we noticed some things we are happy with and others that we could have done differently.

When reflecting on the qualitative research the respondents we interviewed work in Flanders and Brussels. We did not interview any Walloon key figures. This is something that has to be taken into account when looking at our report. In our opinion this does impact the quality of the research. All interviews we did were conducted in a proper and professional manner with the proper questions. Our interview was divided into 6 sections. The interview scheme contained all the relevant topics needed to answer the main research question. When we got halfway through the collection of the data, we started getting similar answers. Towards the end, not much new relevant information was being added and we started having saturation. This is a sign of external validity. It indicates that our qualitative research can be generalised to our operational population (police personnel who occupy leadership positions within the organisation).

Firstly, as is the case for our entire thesis, we did not have much time for our quantitative research. This had an impact on the quality of our work. Where we noticed this was with the collection of our data. The window in which we had to gather respondents next to our entire data collection on the qualitative side was quite restricted. This brought many complications. The first, was the fact that we could not reach the desired number of respondents to make our quantitative research representative of our theoretical population. We barely reached a third of what we needed. Because of the same reason our reach was not as broad as we desired. Only 3 of our 73 respondents were from the federal police which gives a distorted view on the opinions.

Next to this our limited timespan meant that we had to conduct the two types of research at the same time. We believe that if we could have done our qualitative part before starting our quantitative the latter part would have been of greater quality. During our interviews with key figures regarding this topic we gathered a lot of useful information regarding various topics. For example, a specific culture within the Belgian police. We could have used this information to formulate better survey questions. In our case, because of our limited knowledge on the topic we did not formulate enough questions to get a clear view on the opinions of our respondents. We could have extracted more survey questions out of our main research question.

Another factor that we noticed is the fact that despite our efforts to make it clear what we understand as predictive policing using a video, it was not always clear for the respondent. We don't know if it's the fact that our video was faulty or if they just didn't watch it. We noticed that the term 'predictive policing' was understood in the broad term rather than predictive algorithms using artificial intelligence. With hindsight we think that we could have done better with this part of our research.

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Attachments

Interview respondent 1

Inleiding

Respondent is tewerkgesteld op de dienst informatiebeheer, waar er strategische en analytische informatie beheerd wordt. Daarnaast analyseren ze alle binnenkomende informatie die nuttig kan zijn op het terrein: ruwe data = bruikbare data. Hij/zij had ook kennis van predictive policing en was een persoonlijke interesse. Ook bij de opstart van hun Lokaal Informatie Kruispunt willen ze gebruik maken van een aanpak die gelijkaardig is op die van "predictive policing", maar dan zonder gebruik te maken van software. Wat de verschillende technologieën die binnen de Belgische politie gebruikt worden betreft had mijn respondent er kennis van, maar bij die vraag legde hij/zij de nadruk of predictive policing reeds geïmplementeerd werd in ons land en daarover kon de respondent geen uitspraken doen.

Praktisch

- Volgens de respondent is de nodige kennis en infrastructuur om predictive policing te ondersteunen in zekere mate aanwezig, maar de vraag blijft of overal in ons land dit systeem kan worden geïntegreerd binnen de werking van de politie. Ook binnen de Federale politie en meer bepaald bij DRI bestaat de kennis over dit soort technologieën. Wat de Lokale politie betreft beschikken sommige politiezones zeker over de nodige kennis, maar is nog te vroeg om uitspraken te doen over de mogelijke implementatie van predictive policing. Op dit ogenblik is er ook "vernieuwing" binnen de Belgische politie gaande en binnen 5-10 jaar zou de toepassing mogelijk zijn. Hij/zij was ook van mening dat de basis om hoe met dergelijke informatie om te gaan en de fundamenten zeker reeds gelegd zijn en de verdere evolutie van informatiegestuurde politie te voeden aanwezig is. Daarnaast was mijn respondent van mening dat predictive policing zeker van meerwaarde kan zijn binnen de betreffende dienst. Hij/zij bouwde hier op met zijn standpunt dat prescriptive policing ook een belangrijke schakel kan vormen. Verder zouden soortgelijke technologieën niet uw menselijke politionele inbreng of de "gut feeling" van de agenten zouden vervangen. Deze technologieën zijn en zouden moeten blijven als een hulptool voor de agenten. Mijn respondent is van mening dat niet iedereen binnen de politie een expert moet zijn wat predictive policing betreft, maar interne en ook externe opleidingen van de geschikte personen blijft een mogelijkheid. Ook deelde hij/zij mee dat het tijdens de selectieprocedure van belang is om de geschikte personen aan te werven, die soortgelijke informatie en databanken kunnen beheren, strategisch kunnen denken en analyses uitvoeren.

Toekomst

- Het gebruik van predictive policing softwares zal in de toekomst zeker in ons land geïmplementeerd worden. Mijn respondent maakte een interessante uitdrukking nl. dat predictive policing eigenlijk al lang binnen de politie wordt toegepast, maar zonder het gebruik van extra tools als software. Het gebruik of de toepassing ervan gebeurd puur door de bestaande data over bepaalde criminele feiten te analyseren en op basis daarvan een plan van aanpak van dit fenomeen op te stellen. Dit is ook te zien in de "black points" of de vooropgestelde overlast plaatsen, verkeersassen, en ook hoe de prioriteiten binnen het Zonaal

Veiligheidsplan worden opgesteld: op basis van bestaande criminaliteitscijfers een voorspelling maken over de te verspreiden fenomenen in de komende 4-5 jaar.

- Mijn respondent deelde ook mee dat dergelijke investeringen op vlak van informatiesturing zeker op de agenda staan. Voor hem/haar bestaat predictive policing uit 4 grote factoren, zijnde de: *het voeden-verzamelen-verwerken-vinden van de data, de analyse van de data, goed ICT-infrastructuur, en de briefing/verspreiding van de informatie of data.* Natuurlijk maakt het menselijke aspect ook een belangrijke deel van. Hij/zij is ook van mening dat hotspot prediction de meest van toepassing kan zijn. Daarnaast is volgens hem/haar de onbekendheid van het systeem en ook de kosten die daaraan zijn verbonden de grootste reden waarom predictive policing niet in België is geïmplementeerd. Daarom is er een overkoepelend aanpak nodig om dit en andere technologieën in de komende jaren te kunnen toepassen. Daarnaast zijn ze als politiezone altijd op zoek naar open sources en mogelijke manieren om hun korps te digitaliseren.

Ethisch & Legaal

- Wat de gerechtvaardigde dataverzameling en privacyschending betreft, werken ze onder de MFO3 dat ook gekoppeld is aan het wet op het politieambt. De informatiebeheer inzake de politionele databanken dient toereikend, terzake dienend en niet overmatig van aard te zijn. Verder kan het COC-orgaan kwaliteitscontroles uitvoeren om te waarborgen dat alle informatie dat verzameld en verwerkt wordt voldoet aan de wettelijke bepalingen. Waar de grens ligt i.v.m. dataverzameling ligt verwerkt in de MFO3. Volgens hem/haar is het ook van belang dat de wettelijkheid van die systemen gewaarborgd wordt en dat er geen onethische zaken gebeuren bv. etnisch profileren.

Knelpunten

- De mogelijke nadelen kwamen kort al aan bod. Het gevaar op etnisch profileren, of veralgemenen op basis van de verworven informatie over een bepaalde persoon naar het bredere publiek   Het systeem zou volgens hem/haar aan een objectieve informatie een subjectief gevolg geven, maar in sommige gevallen is dit in mindere mate mogelijk. De voordelen van predictive policing uiten zich in het sneller anticiperen op gebeurtenissen, veranderingen, en mogelijks nieuwe fenomenen binnen de maatschappij. Het is ook dan mogelijk om dit allemaal in real-time te doen en kan de effectiviteit, en de efficiëntie van de interventies verhogen. Verder heeft hij/zij ook de bereidwilligheid van het politiepersoneel om predictive policing te gebruiken als "hoog" ingeschat mits ze inzicht hebben in wat het systeem is en wat de mogelijke toepassingen ervan zijn. Volgens hem/haar zou ook de acceptatiegraad van de burgers redelijk hoog liggen bij duidelijke communicatie vanuit de politie. Hier kan feedback vanuit de burgers ook een belangrijke factor zijn. Daarnaast dient de politie met de burger duidelijk te communiceren over de finaliteit van het systeem en welke informatie er gebruikt zal worden.

Slot

Niet relevant voor het verdere verloop van ons onderzoek.

Interview respondent 2

Inleidende vragen

- Mijn respondent omschrijft zichzelf als een techneut, alles wat met technologie te maken heeft, of met vernieuwing, vindt hij/zij zeer interessant, en behoort tot zijn/haar takenpakket. De dag van vandaag valt predictive policing onder de noemer intelligence led policing, zowel voor gerechtelijke feiten als voor verkeersfeiten. Zijn/haar takenpakket behoort vooral tot de snelwegen, waarop we vooral gebruik maken van ANPR camera's: Wie is er op een bepaald uur op een bepaalde plaats geweest. Maar op dit moment is het dus vooral reactief dat er opgetreden wordt. Het is moeilijker om op te treden op plaatsen zoals snelwegen, doordat je publiek dagelijks verandert, wat je bijvoorbeeld in de stad minder hebt. Ring rond Brussel is een transitpunt: grote verkeersader voor zowel belgen, nederlanders, duitsers, engelsen,... De situatie is dus afhankelijk van het publiek. Oekraïne: vaak identiteitsfraude. Reden: corruptie in oekraïne. Oplossing: dieper gaan controleren in het systeem voor identiteitsfraude. Bij een controle moet men tot in het thuisland zelf contact opnemen. Predictive policing kunnen we met andere woorden waarmaken door effectief te gaan controleren op vrachtschepen met containers uit risicolanden: waar bijvoorbeeld grote kans is dat de container drugs bevatten. Ook actieve controles op risico firma's,... Hiervoor hebben we een massa aan informatie nodig, die wel effectief bestaat, maar niet aan iedereen geleverd kan worden.

Praktisch

- In belgië beschikken we over nationale databanken: gebouwen, wapens, goederen. Dit behoort eigenlijk tot de overheden. Naast de overheden beschikken we ook over camerasystemen, die behoren tot gemeenten en gewesten, die door een wetswijziging nu ook tot onze bevoegdheid horen. Daarnaast zijn er ook camera's die toebehoren aan wegen en verkeer, perks in Wallonië, Mobilis Brussel, steden en gemeenten, private cameras. Hierdoor hebben we niet tot alle camera's toegang. Enkel na een ongeval kunnen we inkijk nemen in deze beelden, waardoor we weer terechtkomen op het reactieve luik. Er is dus geen sprake van predictive. ''In dit opzicht vind ik predictive policing een prachtig gegeven: je gaat alles samenvoegen om de toekomstige feiten aan te pakken. Vb: toekomstige schepen aanpakken doordat de kans groot is door het land van herkomst. Gegevens schepen: bevoegdheid van duane, private firma's, waardoor toegang tot info niet toegankelijk is. Een ander obstakel is de privacywet: we kunnen niet zomaar alles controleren''.

Integratie van pp

- Toegang moet er zijn tot informatie voor bepaalde diensten, maar misbruik moet gereduceerd kunnen worden. Een positieve evolutie die we momenteel vooral binnen politiezones van limburg zien is dat de zones zelf steeds groter worden. Net zoals brandweerzones moeten de politiezones over een breder gebied kunnen ingedeeld worden. Voordelen van het vergroten van zones is de informatiestroom die beter toegankelijk is voor bepaalde diensten.

Toekomst

- Huidig commissaris generaal de Messmaker is Pro IT: Er wordt zeker en vast rekening gehouden met predictive policing in het toekomstbeeld van de maatschappij. Kleinere politiezones vormen een probleem, maar hier kan een samenwerking door ontstaan met grotere

zones. Om een voorbeeld te geven: enkele jaren geleden is een samenwerking tot stand gekomen tussen Microsoft en de politiezones, wat het verspreiden binnen onze politiezone een enorme meerwaarde heeft opgeleverd. Ook het gebruik van persoonlijke emailadressen vergemakkelijkt de situatie binnen de structuur.

Ethisch & Legaal

- Mits het invoeren van duidelijke regels vind ik persoonlijk dat alles zou mogen gekoppeld worden aan gerechtvaardigde dataverzameling. Om een voorbeeld te geven: de politiediensten gaan eindelijk toegang krijgen tot de verzekeringsgegevens van wagens. waarom heeft dit zo lang geduurd? vooral door commerciële redenen: bedrijven zijn bang om klanten te verliezen na het koppelen van informatie aan de politie, waarom ze naar een ander gaan. Dagelijks worden 10tallen onverzekerde voertuigen uit het verkeer gehaald, die door middel van ANPR zouden gefilterd kunnen worden en meteen uit het verkeer kunnen worden gehaald. Ook QR-codes zijn een enorm voordeel binnen onze maatschappij, die dingen kunnen voor alles van toepassing zijn. Het commercieel aspect zou moeten kunnen achterwege gelaten worden, dan zouden we op een vlotte manier naar een volgende stap kunnen geleid worden. De BoM (bijzondere opsporingsmethode) wetgeving omvat wetgevingen waaronder predictive policing valt.

Knelpunten

- Het niveau van vertrouwen van de bevolking ligt momenteel te laag om dergelijke systemen te kunnen implementeren. De politiediensten moeten terug dichter bij de bevolking kunnen komen op een positieve manier. We hebben ondertussen te maken gekregen met La Boum 1, 2 en 3, waarbij een duidelijk signaal werd uitgestuurd door de bevolking. Dit signaal is niet alleen naar de overheid. Het is ook naar de politiemensen gericht. Het is een vorm van protest naar: wij zijn niet akkoord met hoe er met ons wordt omgegaan. Het vertrouwen moet zodoende terug opgebouwd worden door de wisselwerking tussen burgers en politiemensen. De mensen kennen politiemensen enkel op de manier van alcoholcontroles, drugscontroles, snelheidscontroles,... waarin de perceptie eigenlijk wordt gericht op de negatieve acties binnen de politie.

Slot

- Mijn respondent gaf aan dat alle noodzakelijke informatie voor ons onderzoek was meegedeeld.

Interview respondent 3

Inleidende vragen

- Kennis van PP: Eén respondent was volledig op de hoogte van predictive policing omdat de respondent al eens een kijkje nam in Nederland, naar het CAS systeem. Ook nog door zich te verdiepen in de literatuur en kreeg ook al eens een presentatie daaromtrent. Twee respondenten kennen predictive policing in de ruime zin omdat ze al aan predictive policing (ruime zin) doen, maar zonder de AI. Bijvoorbeeld dat ze al jaren acties doen naar transmigratie, gebeurt op bepaalde tijdstippen waar men denkt dat ze zich gaan tonen (informatie gestuurd). Eén respondent heeft af en toe wel eens iets over predictive policing gehoord op informatie-en beleidsdagen maar nooit ermee gewerkt. In het algemeen hebben de respondenten kennis van de moderne technologieën die binnen de Belgische politie worden gebruikt.

Praktisch

- Bijna genoeg geavanceerd: toegang nodig tot aantal databronnen, werken in de richting ervan tot koppelen van verschillende databanken, en de onderlinge relatie tussen de verschillende databanken, lopende investeringen ivm analyse toepassingen. Specifieke korpsen zouden met bepaalde investeringen in staat zijn om dit te kunnen implementeren, maar op nationaal niveau is het infrastructuur niet genoeg ontwikkeld. Grote digitale evolutie is bezig die zich zal voortzetten in de komende jaren. Ook in de toekomst is het de bedoeling om geavanceerde systemen toe te passen. Infrastructuur onvoldoende momenteel en binnen 3 jaar, waarschijnlijk wel. De evolutie loopt in de goede richting, maar de cultuur dient ook mee te evolueren. Er komt project-innovatie die de innovatie binnen de politie moet stimuleren. Je ziet wel dat er diensten initiatief nemen om bv. ILP te implementeren of smart policing, en dergelijke. Bottom-Up approach nodig ('de bottom', wil wel maar zijn niet toegelaten, cultuur is er niet om dat toe te laten). In het algemeen is het wel zo, dat een aantal moderne verwerkingstechnieken, machine learning en artificial intelligence een meerwaarde kunnen betekenen en in de toekomst in een aantal gevallen bijna niet zonder kunnen, de samenleving is aan het veranderen (*De samenleving digitaliseert dit betekent ook dat de politie meer en meer wordt geconfronteerd met digitale (forensische) data die moeten verwerkt worden. Belangrijk is in welke mate de modellen voorspelbaar zijn om ermee iets te kunnen doen en ook de wettelijke kader het toelaat. In het algemeen, voorspelling en het gebruik moet nuttig zijn (case per case). Ook de efficiëntie en de accuraatheid van de resultaten/voorspellingen is van groot belang.)* Specifieke functies die de modellen ontwikkelen, trainen, evalueren, en meer inzetten op hoe de gevaren en risico's van PP kan vermijden (self-fulfilling prophecy[26], privacy, wetgeving) en gepaste vorm van human oversight (bewust zijn van de foutenmarge en de juiste interpretatie van de resultaten). Functie per functie moeten er opleidingen komen. Huidige personeel moet worden opgeleid.

Toekomst

- Er is behoefte aan en het zal zeker naar België overwaaien, maar niet noodzakelijk in dezelfde vorm. Eventueel kunnen we de eerste vormen van hot-spot policing in bepaalde steden zien en zal de effectiviteit daarvan gecontroleerd worden. PP inzetten daar waar nodig, waar het op een correcte manier gedaan kan worden. Grote investeringen gepland in I-policing, mogelijk tot meer geavanceerde gegevensverwerking (beeld, geluid, etc. interpreteren). (Extra vraag "*Wat is uw uw mening over PP?*") Analisten eerder een positieve kijk op PP, hoe meer software ter beschikking hoe groter de kans dat die zou willen worden gebruikt en dit in alle diensten bij de politie. De leidinggevende binnen de Federale Politie heeft toch een meer sceptische kijk aangezien dit een grote investering is en toch de meerwaarde daarvan niet duidelijk is. Niet specifiek PP, maar AI-toepassingen in het algemeen zouden ook bruikbaar zijn: speech to text, cognitieve software om beeldmateriaal te analyseren. Afhankelijk van het fenomeen is de aanpak en de toepassing van de software ook anders en ook de meerwaarde die je kan realiseren. Je zou ook in combinaties werken, hangt allemaal af van de fenomenen. Misschien inzetten op de zwaardere feiten (threat to life). Het moet ook kaderen binnen het beleid, wat is de meerwaarde en de kwaliteit van de voorspellingen.Politie werkt binnen een wettelijk kader en aanpassingen daarin kunnen enige tijd innemen om dit op een correct manier te doen. In het verleden was de infrastructuur er ook niet voor klaar. Alles is nog niet bij elkaar om dit momenteel klaar te kunnen maken. Binnen 3 jaar zal de verandering waarschijnlijk gebeurd zijn. *De samenwerking/communicatie is een knelpunt tussen Lokale en Federale Politie?* Lokale Politie kan veel sneller reageren op veranderingen, andere hiërarchie en werking ook over andere budgetten. Hangt ook zeer sterk af van de lokale zone zelf en hun middelen. Om nationale systemen uit te rollen zit je vaak met vertragingen door o.a markt procedures ivm met grote budgetten en technisch meer uitdagingen om op een grote schaal uit te rollen (3 talen).

Ethisch & Legaal

- Ethische grens: Heel simpel, de wet volgen ook op EU-niveau GDPR en de wetten rond Law Enforcement directive die geïmplementeerd is in de Wet op de Politieambt. De wet gaat iets te veel richting bescherming volgens hen. Dataretentie is politioneel een ramp. De wet rond privacy is voldoende streng en zelfs iets te streng in het kader van politie. Men kijkt vaak negatief naar data voor overheidsgebruik. De politie heeft geen commerciële belangen bij het verzamelen van persoonlijke gegevens, wordt enkel gebruikt voor veiligheid van de samenleving. Hun enige doel is het streven hiernaar. (Opmerking dat er schendingen van privacy zijn in privésector bv naar kinderen gericht etc., discrepantie tussen wat er wordt verwacht van overheid en privé). Voorbeeld van Facial recognition: Wat is het doel die we nastreven? Je moet altijd rekening mee houden bij zo'n kwesties. Het wettelijk kader volstaat hiervoor om dit correct te kunnen integreren. Bij het opkomen van nieuwe technologieën komen vaak aanvullingen aan de wet mee. Kunnen zelf kleine issues zijn die steeds worden opgelost/aangepast. De wet op het politieambt zou ook volstaan. Maar op het moment dat er nieuwe technologieën door de politie gebruikt worden, zal de wettelijk kader ook mee evolueren. Het testen en ontwikkelingen van de algoritmen ⬚ Is belangrijk dit grondig te doen voor het implementeren van nieuwe methodes o.a. i.v.m. het wettelijk kader. Misschien kijken naar de wet om requirements voor te leggen voor zo'n testen en implementaties. Hangt ook allemaal af van hoe de bestaande regels zullen geïnterpreteerd worden.

Knelpunten

- Voordeel: Vooral hulp bij efficiënt werken. Zou zeer goed helpen met efficiënt en effectief data te verwerken. Nadeel: cultuur binnen de Belgische politie, grote stappen, engagement van de overheden, je moet namelijk kunnen bewijzen dat al het overheidsgeld niet voor niets is gebruikt en men is niet zeker van de efficiëntie. Draagvlak moet er zeker zijn en de vertaling moet er zijn van je data naar het effectieve beleid die erop volgt met oog op bruikbaarheid voor het terrein, Ook risico op tunnelvisie, het risico dat andere middelen aan de kant worden gelegd en dat men alleen focust op PP. Gevaar van self-fulfilling prophecy als je focust op een bepaalde soort "doelgroep" of bepaalde zones. Komt tot de essentie: predicties zijn niet 100% accuraat en wanneer de input van mindere kwaliteit is kan men dus slechte resultaten hebben, die moeten we dan niet doorgeven aan te veel mensen die dan achteraf teleurgesteld gaan zijn. Er moet een cultuur worden ontwikkeld om meer stapsgewijs werken met testen en proeven en dan uitrollen vanaf dat die voldoende matuur zijn (proof of concept). De cultuur van innovatie en opbouwen op het testen van methodes moet op gang gezet worden. (Herhaling van tunnelvisie vermijden). De Technologie moet gekaderd worden binnen een beleid waar de juiste prioriteiten worden gesteld (bv cybercrime) en het uitrollen van middelen na een predictie moet ook proportioneel zijn. De bereidheid zal wellicht laag zitten, indien je kan aangeven dat het systeem resultaten kan bieden. Eens resultaten binnenstromen zal de mening snel veranderen. Werd ook gezien met de "New way of working" Zeer belangrijk om opleidingen te voorzien en niet laten overkomen als een extra last maar tonen dat er voordelen zijn en dat sommige zaken gemakkelijker zullen verlopen. Opleidingen binnen kleinere groepen met video's die men kan herbekijken etc. Hinderpaal voor de implementatie van PP: Wat brengt het op voor de gemiddelde politieagent? Men kan geen tastbaar resultaat of onmiddellijke meerwaarde geven de positieve kant is niet concreet, zeker voor iemand die werkt op het terrein. De meerwaarde die PP kan brengen zal niet onmiddellijk een meerwaarde zijn voor het politiepersoneel zelf maar eerder voor de samenleving. De predictie en het menselijke component dienen hand in hand lopen. Het ene mag het andere niet vervangen, dit moet aanvullend zijn. Zal zeer subjectief geïnterpreteerd worden (andere kijk van een dader/gecontroleerde dan een slachtoffer/gewone burger) communicatie zal hier ook een belangrijke rol spelen. Een grote groep mensen zal hier ook helemaal niet van wakker liggen, hangt opnieuw af van hoe je in contact komt met politie. Invloed van media? De rol van de media is hierin ook niet te onderschatten. Als men de mening populatie kan linken aan de politiek. Wanneer een (controversieel) artikel zou uitkomen zou er daar onmiddellijk sociaal en dus ook politiek debat rond ontstaan. Gevaar hier rond is dat er beslist wordt dat er niets mee zal gebeuren. Dit kan een gevaar zijn als men het slecht communiceert of onvoldoende contextualiseert. Het zal de rol zijn van de politie om de positieve kanten/resultaten in de verf te zetten bij de communicatie. De context naar een veiligere samenleving is ook van belang om te vermelden.

In die context wordt ook vaak privacy aangehaald, kan met bepaalde instanties privacy verbeteren. BV een algoritme die storend gedrag herkent in geanonimiseerde beelden en die enkel onthult bij verdacht gedrag. Het gebruik van data in de privé sector aan het licht brengen in de paper. Een knelpunt zou ook zijn de samenwerking met private partners (telefoon (proximus), containers (transmigrant)) belang van private sector binnen deze methodologie. De private actoren zullen niet snel data delen met overheid/politie. Dit omdat ze potentieel tijd kunnen verliezen of de data kwijtspelen aan concurrenten etc. Ze blijven buiten het debat, tegen het algemeen belang in. Vraag om dit in ons thesis te integreren.

Slot

- Niet relevant voor het verdere verloop van ons onderzoek.

Interview respondent 4

Inleidende vragen

- De respondent heeft regelmatig stagiairs en vorig jaar was er een stagiaire van de richting criminologie Gent. Deze stagiaire had dit thema uitgewerkt in een paper, waarbij hij haar begeleidde. 2 jaar geleden was er een evaluatie van de politiewerking en hier kwam het thema Predictive policing ook aan bod. De respondent geeft aan dat er binnen de zone gewerkt wordt met met GIS-pakketten. Dit staat voor geïntegreerd/geografisch informatie systeem. Waarbij je criminaliteitsgegevens op kaart gaat brengen. Hierbij kunnen we zwarte punten aanduiden zoals gevaarlijke kruispunten. Vroeger werd dit met speldenprikjes op kaart gebracht maar nu gaat dit meer automatisch. We kijken ook op welke plaatsen er het meest slachtoffers zijn. Binnen onze zone hebben we af en toe te maken met gauwdiefstallen. Met behulp van dit systeem kunnen we aankaarten waar deze criminaliteit voorkomt en ook wanneer dit meestal gebeurt. Deze informatie gebruiken we om goed toezicht te kunnen houden. Dit is ook een beetje voorspellen aangezien we informatie gebruiken van het verleden, het is een soort hotspot-analyse. Met predictive policing kan je wel extra informatie verwerken, dader-profiling zit hier bijvoorbeeld niet in.

Praktisch

- Het is een kwestie van aankopen van bepaalde technologieën. Er zijn wel wat andere issues zoals de kwaliteit van onze databanken. Zijn deze voldoende om dergelijke systemen op toe te passen? Bepaalde vormen van criminaliteit kunnen we beter op kaart brengen. Sommige zaken van criminaliteit worden te weinig aangegeven zoals intrafamiliaal geweld. Werken we met de juiste informatie om te starten? In het geval van drugs gaat er ook niemand gaan aangeven dat hij/zij drugs heeft gebruikt of gedeald. De databanken zijn daarom niet volledig. Grey- en dark number moet je in rekening houden. Dit wordt wel onderzocht bij de veiligheidsmonitor. *I: Zie je een mogelijke meerwaarde bij het gebruik van Predictive policing?* Dat is een beetje dubbel. Ik heb wat twijfels over de techniek en de effectiviteit van deze techniek. Het staat nog allemaal wat in zijn kinderschoenen. Ik heb zelf nog niet gezien dat het effectief doet wat het beloofd te doen. Het is een risico om met iets te starten die nog niet zo goed geëvolueerd is. In onze zone gaan we hier niet mee starten zolang we goed weten dat deze techniek effectief werkt. In België zit het nog in een wetenschappelijk discours, de universiteiten zijn hier volop mee bezig. *I: Hoe kunnen dergelijke technologieën binnen de Belgische politie het best geïntegreerd worden? (Politieopleiding/interne opleiding)* Eerst gaan we ons informeren bij diensten die het al gebruiken en kijken wat er op de markt is. Zijn deze programma's goed? Als het iets goed is kunnen we hier in investeren. Maar momenteel wachten we nog even af. We moeten dan ook kijken wie binnen het korps kan hier mee overweg, hoe ga je het toepassen,… Er zou dus ook een opleiding moeten komen. Ik denk niet dat dit nodig is voor het uitvoerend kader maar eerder voor de leidinggevenden, beleidscellen of lokaal informatiekruispunt.

Toekomst

- Als er dingen gebeuren in landen rond ons wordt er ook de vraag gesteld: 'kan het in ons land ook toegepast worden?' Voorlopig zitten we nog in de beginfase. Momenteel hebben we al veel geïnvesteerd. Meer en meer laten we de technologie het politiewerk ondersteunen. We investeren nu momenteel in meer camerabewaking. ANPR-camera's, bodycams zijn zaken waar we nu mee werken. Hierbij krijgen we ook meer informatie en dan is het aan ons om te kijken hoe we deze informatie kunnen gaan gebruiken. We investeren ook in slimme camera's, deze camera's detecteren vanzelf als er iets misloopt. We hebben heel veel informatie maar de challenge zit in hoe kunnen we dit goed gebruiken. We zoeken nog iets die alles bundelt waarbij

je in een paar klikken bij de juiste info terechtkomt. *I: Welke soort PP denkt u dat er zal gebruikt worden moest dit geïmplementeerd worden binnen de Belgische politie? (hotspot prediction, perpetrator prediction, victim prediction).* Ik denk dat ze allemaal wel een meerwaarde kunnen betekenen. *Is er een volgens u een concrete reden waarom PP nog niet gebruikt wordt binnen de politie in België?*Ik zie geen specifieke reden maar het zit nog in een academisch discours en we wachten af tot er een goede evaluatie van deze systemen zijn te vinden.

Ethisch & Legaal

- *I: Waar ligt de grens tussen gerechtvaardigde dataverzameling en privacyschending volgens u?* Ik ben hier geen specialist in privacy maar binnen het korps hebben we een persoon die zich bezighoudt met privacy en GDPR wetgeving. Doordat de GDPR bestaat denk ik dat we predictive policing kunnen gebruiken. We hebben ook beroepsgeheim en wet op de politieambt. Ik denk dat er voldoende kader is om zulke zaken te gaan toepassen. *Bestaat er een wettelijk kader voor het gebruik van PP binnen de Belgische politie?* Niet specifiek voor predictive policing maar ik denk dat het huidig kader wel kan toestaan om dit te gebruiken. *Denkt u dat PP past binnen het deontologisch kader van de Belgische politie?* Evaluatie blijft belangrijk hier in. Als we kunnen bewijzen dat het doet zoals beloofd, denk ik dat er weinig issues hier rond zullen zijn. Als we met de politie meer op de juiste plaatsen zijn kan dit alleen maar ten goede komen voor de maatschappij.

Knelpunten

- *Wat zijn de nadelen van PP volgens u?* Er zijn duidelijk een aantal risico's. Stigmatiseren en discriminatie van personen bij bijvoorbeeld perpetrator prediction. Ook de input van de data, als dit zaken zijn die de politie zelf gaat verzamelen over individuen kan dit met een zekere vooringenomenheid gebeuren. Het kan wat voorspellen wat je wilt voorspellen (self fulfilling prophecy). Stel dat je uit die profiling kan halen waar er risicoplaatsen zijn, kan dit voor extra gevoeligheid zorgen bij de bewoners. Als je ergens meer patrouilleert zal je daar ook meer informatie gaan verzamelen. Dus hier zitten we weer met de self fulfilling prophecy. Weten we zelf nog waar we mee bezig zijn? Als we de machine het werk laten doen in onze plaats, zonder goed te weten wat er helemaal achter zit. Deze systemen werken met algoritmes maar wie heeft deze opgesteld en hoe werken ze? Als we moeten gaan motiveren wat we precies doen, kan dit moeilijk worden. *Wat zijn de voordelen van PP volgens u?* Capaciteitswinst is een groot voordeel, als je met de juiste mensen op de juiste plaats bent met het juiste materiaal. Het kan ook bijdragen naar meer veiligheid in de maatschappij. *Hoe hoog schat u de bereidheid van het politiepersoneel om 'predictive policing' te gebruiken?* Ik denk dat het wel hoog kan zijn als het zijn meerwaarde kan bewijzen. Ik verwacht vooral uit de hoek van de universiteiten een grondige evaluatie. *Wat is uw mening omtrent de acceptatiegraad van de burgers, indien dit soort technologie naar België overwaait?* Ik denk dat er weinig heisa hier rond zal zijn. Als we kunnen bewijzen dat het een goed middel is en de buurt veiliger kunnen maken met deze systemen. Ik denk dat vooral de issue zal liggen wanneer iets verkeerd zou gaan.

Interview respondent 5

Inleidende vragen

- Functie: Strategisch analist, het is de bedoeling dat de beschikbare data wordt omgezet naar bruikbare informatie voor de politie. Daarnaast is het van belang dat de informatie op drie niveaus bruikbaar blijft nl. praktisch, tactisch en strategisch. In het algemeen had deze politiezone kennis van predictive policing aangezien UGent hen ook in een doctoraatsonderzoek betrok. Verder had de respondent ook kennis van de moderne technologieën die binnen de Belgische politie worden gebruikt. Hij/zij heeft de 2 verschillende softwares vermeld die gebruikt worden in het kader van terrorisme en ook I-policing en LED-policing aangehaald.

Praktisch

- Wat de infrastructuur van de Belgische politie betreft was mijn respondent van mening dat die er bestaat, maar hij deelde mee dat op vlak van personeel het in mindere mate aanwezig was. Wat hij met zijn uitspraak over het personeel bedoelde is het feit dat volgens hem een "mindswitch" binnen de Belgische politie moet gebeuren. Deze "mindswitch" zou ervoor zorgen dat het personeel meer open staat voor het gebruik en niet enkel voor het gebruik, maar ook om hierover kennis te verwerven en hierin te investeren. Verder was mijn respondent van mening dat de technologie een praktische meerwaarde kan vormen aangezien de politie deze kan gebruik om op een proactieve manier kan reageren. Hierbij deelde hij/zij mee dat er vroeger ook moeilijkheden waren bij het overschakelen van het reactieve naar de meer proactieve aanpak die bij een groot deel van de Belgische politie aanwezig is. Daarnaast was mijn respondent van mening dat predictive policing het best door middel van interne of bijkomende opleiding kan worden aangeleerd en dat in de toekomst toch tijdens de politieopleiding aan bod kan komen. Als laatst heeft mijn respondent meegedeeld dat er meer onderzoek nodig is om te achterhalen hoe en welke faciliteiten ze moeten ondersteunen.

Toekomst

- Mijn respondent was van mening dat, dit soort technologieën vroeg of laat naar België zouden overwaaien en had ook kennis over het gebruik van CAS in Nederland. Hierbij stelde ik de vraag of er een gelijkaardige aanpak als in Nederland mogelijk is om een software op nationaal niveau te lanceren. In zijn antwoord deelde hij/zij mee dat gelijkaardige aanpak mogelijk was, maar volgens hem/haar dienen er eerst 'pilots' te worden gestart in grote, middelgrote en kleine politiezones om de optimale werking van de software te kunnen achterhalen. Verder deelde mijn respondent mee dat dergelijke investeringen niet op de agenda staan bij zij. Daarnaast was mijn respondent van mening dat mapping/ hotspot prediction de meest bruikbare vorm van predictive policing zijn. Hierbij deelde hij/zij mee dat het karakter van de andere twee aanpakken het moeilijker zouden maken om in België in de praktijk toe te passen. In de volgende vraag over de reden waarom predictive policing niet in België wordt gebruikt bouwde hij/zij verder op zijn vorige statement dat de toepassing in de praktijk moeilijker is dan in theorie. Ten eerste dienen de gevaren van PP geanalyseerd worden: neveneffecten, verplaatsingseffect, contra vanuit criminele milieu, het gevaar van over-policing, stereotype, self-fulfilling prophecy enz.

Ethics & Legaal

- De vraag over de grens tussen gerechtvaardigde dataverzameling en privacyschending werd kort beantwoord. Mijn respondent deelde mee dat de politie niet mag afwijken van de Europese of de Belgische regelgeving omtrent de verzameling van persoonlijke gegevens en alleen maar strikte noodzakelijke data mag worden verzameld. Hierbij kwamen de wet op het Politieambt, GDPR enz aan bod. Ook hier werd het COC vermeld en het controleorgaan van de politie Comité P. Verder deelde hij/zij mee dat op vlak van "wettelijkheid" de aanpak van het COC gepast is, maar indien dit soort technologie wordt gebruikt zal de capaciteit van het COC fors moeten stijgen om alle toepassingen van predictive policing te kunnen nagaan.

Knelpunten

- De mogelijke nadelen van predictive policing kwamen reeds aan bod in de laatste 2 zinnen bij het deel over 'Toekomst'. Hierbij heeft hij/zij nog toegevoegd dat de menselijke factor in policing verminderd. Wat de voordelen betreft zei hij/zij dat het systeem ervoor kan zorgen dat de politie efficiënter, en effectiever aan de slag kan gaan. Daarnaast ook zou het verdelen van de taken vlotter en gerichter verlopen. Over de bereidheid van het politiepersoneel om predictive policing te gebruiken deelde hij/zij mee dat vooraleer deze zou verhogen is er eerst een mentaliteitswijziging nodig omtrent dit soort technologieën en natuurlijk is er tijd nodig om dit allemaal in de praktijk te implementeren. Mijn respondent was ook van mening dat de enige manier om de acceptatiegraad van de burger i.v.m. predictive policing zo hoog mogelijk te trekken is om zo transparant mogelijk te zijn, dit zowel bij de uitvoering als de dataverzameling. Ook dienen de burgers goed geïnformeerd te zijn over de mogelijkheden van dit systeem.

Slot

- Op het einde vermelde mijn respondent dat het interessant zou zijn om personen vanuit het Comité P, Justitie en meer leidinggevend personeel in ons onderzoek te betrekken.

Interview respondent 6

Inleidende vragen

Mijn kennis is beperkt maar ik heb wel een idee naar welke richting predictive policing gaat. Het laatste dat ik ervan gehoord heb is van bij mijn opleiding 'criminologie et police' waarbij het ging over de initiatieven die bestonden bij de Nederlandse politie, dit was in 2014. Naast dit heb ik ook een algemene interesse. Ik herinner ook een artikel van Paul De Hert dat eerder ging over preemptive policing. Dit is vooral gebaseerd op het verjaren van zoveel mogelijk inlichtingen. Een vervolg op informatie gestuurde politiezorg. Recent heb ik ook deelgenomen aan een webinar van de geïntegreerde politie die georganiseerd is geweest door Anke Stakenborg. Zij is hoofdcommissaris van de federale politie en zij is hoofd van de dienst innovatie van de federale politie. Het ging over de modernste toepassingen op het vlak van digitalisatie en innovatie. *Heeft u kennis van "moderne" (computergestuurde) technologieën die worden gebruikt binnen de Belgische politie?* We gebruiken 'Focus' we zijn ook recent gestart met digitale woon controles door onze wijkinspecteurs. Dit is een van de toepassingen dat je kan doen met Focus.

Praktisch

Basisapplicaties en structuur zoals databanken zijn voldoende aanwezig. Er ontbreekt wel een beheersysteem om dit samen te brengen en te exploiteren. Architectuur en infrastructuur van de Belgische politie is momenteel Fides en ISLP (integrated services of local police). ISLP is onze basis informatica systeem van de lokale politie terwijl Fides van de federale politie is. Beide systemen zijn wel compatibel met elkaar gesteld. De grote opvolger om dit allemaal te vervangen is het 'I-police' project. Tegen 2024 zouden we hier een definitieve oplevering van krijgen. Basisapplicaties zijn voldoende aanwezig, het ontbreekt een beheerssysteem. Dus op dit ogenblik neen, het onderliggende hebben we maar de bovenliggende infrastructuur die nodig zou zijn is er nog niet. *Denkt u dat PP voor uw politiekorps/dienst een praktische meerwaarde kan vormen?* Dat zou een praktische meerwaarde kunnen vormen indien blijkt uit testing en ervaring dat het een invloed heeft op cijfers en resultaten. *Hoe kunnen dergelijke technologieën binnen de Belgische politie het best geïntegreerd worden? (Politieopleiding/interne opleiding).* De politieorganisatie werkt met vast benoemde ambtenaren die een groot deel van hun carrière bij de politie doorbrengen. We zitten met een verouderde organisatie, tussen nu en 5 jaar gaat meer dan 1/3 van de politie met pensioen. De invloed hiervan mogen we niet onderschatten. Sommige mensen die dicht bij hun pensioen zijn, zijn digibeet. We zitten dus soms met generatiekloven. Ik denk dat we eerst moeten kijken naar draagvlak, mensen meekrijgen om in dit verhaal te gaan. We moeten mensen kunnen overtuigen dat het een voordeel is. Als we zo ver zijn dan moet er wel een opleiding komen. Er bestaat zoiets als vormingsrecht en vormingsplicht. Vormingsplicht betekent dat mensen zichzelf kunnen vormen dus de nodige aandacht schenken om bij te blijven. Die opleidingen zijn ook vaak gespecialiseerd. Het volgen op zich is onvoldoende, er moeten ook praktische middelen zijn om het te kunnen toepassen. Anders wordt het te theoretisch. Er is een combinatie nodig met het praktisch luik en opleidingen. Om zo een draagvlak te maken moeten we kunnen verwijzen naar plaatsen waar het gebruikt wordt en welke meerwaarde het kan vormen. We moeten aankomen met resultaten, hoe er tijd kan bespaard worden. Hoe het werk kan vergemakkelijken. We moeten ook de optie geven dat er op concrete vragen, concrete antwoorden kunnen gegeven worden. Zorg er ook voor dat het behapbaar blijft. Momenteel zitten we in een digitaliseringproces waarbij ervan alles bijkomt in korte tijd. We zitten momenteel met Focus, GES, management informatiesysteem, Belgische visum en informatiesysteem en nog heel wat. Het wordt zo veel dat het voor de mensen te veel wordt. We moeten een overkoepelende infrastructuur gaan ontwikkelen waarbij het behapbaar en gebruiksvriendelijker wordt want anders verliezen we

personeel. Met de Covid-19 periode zien we dat er mensen een burn-out krijgen omdat ze het niet meer verwerkt krijgen.

Toekomst

Aangezien sommige buurlanden dit al in dienst hebben, denkt u dat PP ook zal overwaaien tot hier? Ik weet dat er ook al dingen gebeuren in België en natuurlijk wordt er dan ook gekeken wat er elders gebeurt. Er zijn dus een aantal pilootprojecten bezig om te kijken wat het allemaal kan betekenen. Ik heb ook recent eens gekeken hoe het hiermee stond. Ik merkte dat er heel wat wishfull thinking was. Corona heeft ook voor een vertraging gezorgd. Ik denk ook dat na Covid we weer in een stroomversnelling zullen geraken.

Ethisch & Legaal

Waar ligt de grens tussen gerechtvaardigde dataverzameling en privacyschending volgens u? We gebruiken de GDPR daarom hebben we ook de data protection officer (DPO). We hebben ook de MFO3, dit is een dwingende ministeriële omzendbrief over informatiebeheer. En een zeer belangrijk artikel op de wet van het politieambt van 5 augustus 1992 namelijk artikel 44.1 en volgende. Hier staat enorm veel over hoe we moeten omgaan met informatie. We hebben hier ook een aantal 'waakhonden voor'. Algemene inspectie van de federale politie en de lokale politie (AIG),Comité P en COC.

Knelpunten

Wat zijn de nadelen van PP volgens u? Een nadeel kan zijn dat men dit als doel gaat beschouwen en niet als middel. De investeringskosten, ontwikkelingskosten. Het mee kunnen houden van ons ouder personeel die hier moeite mee hebben. Te weinig aandacht voor het klassieke politiewerk en gezond verstand. *Wat zijn de voordelen van PP volgens u?* Dat er betere resultaten zijn. Dat we op wijze van spreken een moord kunnen verhinderen, dit is natuurlijk het toppunt. Als we kunnen verhinderen dat er minder diefstallen of andere criminaliteiten gaan gebeuren is dit natuurlijk positief. Datadriven fenomenen efficiënter kunnen aanpakken dat we daardoor onze menselijke interactie beter kunnen inzetten in andere prioriteiten. Dat we daarom ook een verschuiving krijgen van de prioriteiten. Dat we minder tijd verliezen in het behapbaar maken van ongelofelijk veel data. Computersystemen en AI kunnen dit veel sneller en efficiënter. *Wat is uw mening omtrent de acceptatiegraad van de burgers, indien dit soort technologie naar België overwaait?* Op sociale media zijn er veel mensen expert geworden en hebben ze een uitgesproken mening. We merken hierbij dat er steeds meer 2-delingen zijn. Ik denk als we kunnen aantonen dat de politie gebruikt maakt van moderne middelen om criminaliteit efficiënter te kunnen gaan aanpakken, dat er een grote groep mensen hier tevreden mee gaat zijn. Maar aan de andere kant zullen er ook zijn die hier niet tevreden mee gaan zijn. We zullen dus ethische keuzes moeten maken.

Slot

Wilt u nog zaken vertellen die nog niet aan bod zijn gekomen tijdens het interview? Elke nieuwe technologie moeten we kunnen adopteren en dat we dit altijd op een democratische legitieme wijze gaan doen. De veiligheid en welzijn van de burgers moeten prioriteit blijven.

Interview respondent 7

Inleidende vragen

- Reeds projecten gevolgd op afstand, fysieke congressen, vanuit Nederland gezien. Onder Jambon 3 jaar proef gesteld maar niets van gekomen. In Nederland staan ze meer open voor die technologie en nieuwe zaken in het algemeen. Zou kunnen leiden tot een goed resultaat mits in acht nemen van verschillende factoren.

Praktisch

- Infrastructuur: Al kijkend naar evolutie dat ze hebben doorgenomen laatste jaren, veel energie in het beveiligen van het politienetwerk en naar hoger niveau te tillen. Qua verwerking op administratief vlak hadden ze achterstand (word). Wordt niet altijd nationaal doorgetrokken. Best eerst implementeren bij verwerken van al bestaande data. Meerwaarde: local computer crime unit, researchers. Opleiding. Uit ervaring met andere programma's (bv social media monitoring) is het niet gemakkelijk de output correct te interpreteren. Bij integratie van pp mag belangrijke opleiding niet ontbreken en moet van kwaliteit zijn.

Toekomst

- Zekerheid dat het in België komt? Uiteindelijk wel, wanneer we niet meer bang zijn van het onbekende. In het debat staan we er nog weigerachtig tegen. Wat betreft de zone staan ze er zeker voor open om met artificiële intelligentie te werken. AI met live beelden van overlast beelden wordt er algoritme die gaat bepalen of dit bv een groep is die vecht of die gewoon uitbundig is. De beelden zijn geanonimiseerd, belangrijk dat het privacy by design was. Onder andere belangrijk voor publieke opinie. Aangezien hun grensligging, zou hotspot interessant kunnen zijn. Om op te bouwen op cameraschild om criminaliteit in kaart te brengen

Ethisch & Legaal

- Grens: Is moeilijk, altijd data protection officer geweest voor de zone. Nu jurist om beter werk te leveren. Zij kunnen niet zeggen wat er correct is en wat niet. Ook geen wettelijk kader voor dit soort zaken concreet. Eu is bezig met white paper rond ethische kwesties met AI. Uitdaging kan zijn met big data werken. Deontologische code moet aangepast worden. Nationaal gezien werk aan de winkel.

Knelpunten

- Voor/nadeel: Voordeel zaken overnemen die politiemensen geen tijd voor hebben. En nadeel is gevaar in het feit dat men de output neemt als facts en dat men niet gaan controleren. De hyper er rond kan gevaarlijk zijn media etc.Bereidheid politiepersoneel. Bewijzen dat het werkt en dat het meerwaarde heeft. Onder andere voor verschillende taken: dataverwerking. Interpretatie moet ondernomen worden door gespecialiseerd personeel.

Slot

- Media zou wel een impact kunnen hebben, oplossen aan de hand van juiste communicatie van de politie uit. Transparantie zeer belangrijk.

Interview respondent 8

Inleidende vragen

- De respondent is reeds op de hoogte van predictive policing want hij/zij geeft ook les in VIVES-hogeschool. Politie gebruikt reeds FOCUS, PACOS, SharePoint en is 2 jaar geleden overgeschakeld naar office 365.

Praktisch

- Respondent vindt dat de infrastructuur nog niet in orde is. We zijn er naartoe aan het evolueren maar we zijn er nog niet (binnen een jaar of 5). Een meerwaarde van PP zou zijn dat er dan eens proactief gewerkt kan worden. Momenteel worden de technologieën voor 99 % van de tijd reactief gebruikt. Om dit voor elkaar te krijgen, moeten de mensen veranderen op vlak van werken, manier van denken en de software moet toegankelijk zijn voor alle politiepersoneel, want niet iedereen kan even goed omgaan met computers (niet iedereen is een informaticus). Het best om zulke technologieën binnen de Belgische politie te integreren moet gebeuren door eerst en vooral opleidingen en de juiste profielen aan te trekken door concurrerend te zijn met de arbeidsmarkt en door lakser te zijn met de vereisten voor bepaalde functies bij de politie.

Toekomst

- De respondent vertelt dat, wat ze tonen in de buurlanden vaak een lege doos is. Ze tonen daar mooie projecten en zaken, en als je geïnteresseerd bent en je gaat dan daar gaan kijken, blijkt het gewoon een lege doos te zijn. Er gaat veel capaciteit in, maar de resultaten zijn vrij bleek. Voor zijn/haar korps staan er geen investeringen gepland voor predictive policing software of dergelijke. De respondent is geen voorstander van predictive policing, maar wel van gebruik van technologieën binnen de politie. De respondent is vrij sceptisch van predictive policing omdat het nooit onderzocht geweest is op lange termijn. (*In de VS heeft een openbare aanklager een simpel systeem ontwikkeld, een heel eenvoudige computerprogramma waarin ze voorspellingen deden over recidive, programma bleek vrij accuraat te zijn. In Amerika gebruiken ze dat om strafbepaling te doen, ik vind dat een stap te ver. Ga je hem dan beperken in zijn vrijheid. Hetzelfde als bij victim prediction, iedereen weet wie de zwakkeren zijn in de samenleving, ga je ze dan extra beveiligen? Bij hotspot prediction, zie je dan dat er een verplaatsingseffect is, de daders past zich aan.*) Tenslotte is de juiste personeelsbezetting, de technologie en de juridische kader er nog niet om er gebruik van te maken. Wel wordt er massaal geïnvesteerd in andere technologieën. Iedereen heeft een smartphone met alle nodige apps, programma's, ... Er wordt voorzien van opleidingen (ook individuele opleidingen). = Investeren in technologieën en opleidingen. De respondent verteld dat ze nooit de eerste zijn in het toepassen van nieuwe technologieën, ze wachten op de resultaten van anderen (andere politiediensten). Er wordt gekeken voor technologie die een meerwaarde kan dienen voor het personeel, zodat ze rapper, veiliger of beter kunnen werken rekening houdend met de investering omdat het uit de maatschappij komt (het moet verantwoord zijn).

Ethisch & Legaal

- De respondent zegt dat er een begin van basis is met de GDPR-wetgeving (enkel voor data, want voor PP is er nog geen). Hij voegt hieraan toe dat er nu nog toepassingen zijn binnen de politie die de privacy ernstig schendt. (Geen voorbeelden van wat niet wettig is concreet) binnen wet: vb. controles op avondklok via ANPR cameras, stelt zich de vraag of we het doel hiermee niet voorbij schieten. Onder mom van meer veiligheid na de aanslagen, heel ingrijpende stappen genomen voor de privacy zonder dat er voldoende bij is stilgestaan. De respondent denk dat de grens nog niet volledig in balans ligt. Privacy wordt momenteel in heel veel gevallen te veel vrijgegeven, onder het motto, als je niets te verbergen hebt moet je niet vrezen, dat is een volgens hem/haar een hol argument. Tenslotte vertelde de respondent nog dat de deontologische code geschreven is in 2006. Toen bestond predictive policing nog niet. In heel de deontologische code ga je geen enkel woord terugvinden van predictive policing. Maar er staan wel een paar algemene zaken in. Bijvoorbeeld dat je bedachtzaam moet omgaan met de middelen die je aanreikt worden.

Knelpunten

- De nadelen volgens de respondent zijn dat het technisch geschoold personeel ontbreekt om PP aan te maken, gebruiken en te verwerken, verder nog staat de privacy wetgeving nog niet op punt, en tenslotte is het een dure aangelegenheid. De respondent ziet geen voordelen omdat hij de systemen uit het buitenland beschouwt als niet werkende. Bereidheid en acceptatiegraad van zowel het politiepersoneel als de burgers bekijkt hij negatief (lage bereidheid en acceptatiegraad). Hij/zij zegt wel dat er geen probleem is met technologie omdat dit maakt dat alles rapper, beter en veiliger werkt, maar wel met PP, want dat begint tegen de privacy te botsen en mensen hebben daar wel een probleem mee.

Slot

- Politie speelt mee voor een klein deeltje in deze topic. Wetgevende kader, politie, burgers, besturen, etc. allemaal even belangrijk. Politie is maar een kleine schakel.

Interview respondent 9

Inleidende vragen

- Beleidsmedewerker binnen een bepaalde politiezone. Werkt aan voorbereiden van zonale veiligheidsplannen strategische analyses en alles wat organisatieontwikkeling omhelst. Reeds voor het interview kennis van predictive policing. Politie gebruikt zelf focus, heel wat lokale zones zoeken naar lokale toepassingen en zoeken op de privé markt naar nieuwe technologieën om te implementeren.

Praktisch

- Infrastructuur is op zich voldoende geavanceerd maar hangt zeer sterk af van de middelen van de zone. Federale politie heeft minder middelen dan lokale, middelen hangen vaak samen met de capaciteit om dingen aan te kopen en te testen. Toelagen bij lokale politie is ook een grotendeels politiek verhaal, indien er vanuit politiek interesse is in technologie komt er rapper ruimte en middelen vb. ANPR. Hierdoor weinig samenhang in technologische capaciteiten van verschillende zones. Moeilijk te beoordelen of het een praktische meerwaarde vormt voor PZ RIHO omdat meerwaarde in studies nog niet is aangetoond. PP kan misschien niet even goed werken in kleinere zones zoals Roeselare dan in Amsterdam of Chicago omdat er minder bewoners zijn. Minder bewoners = minder data = grotere foutmarges.

Toekomst

- Als buurlanden dit ook adopteren worden mogelijkheden groter, mits de concrete meerwaarde kan aangetoond worden. Er zit bepaalde meerwaarde in waar naar de toekomst toe wordt gekeken, maar denkt niet dat een volledig PP model snel zal overgenomen worden. Belangrijkere investering voor politie op dit moment is personeel, moeten het beroep aantrekkelijker maken. Meer kans dat hierin geïnvesteerd zal worden voorlopige dan in PP. Zeer moeilijk om IT-specialisten aan te trekken tot politie als burgerpersoneel bijvoorbeeld, zijn essentieel voor PP. Uitdaging van de toekomst is niet zo zeer innovatie maar hoe krijgen we als politie mensen binnen op onze diensten. Hot spot prediction heeft meest kans om geïmplementeerd te worden. Perpetrator pred waarschijnlijk enkel voor zaken als terrorisme etc. en victim prediction waarschijnlijk niet. Toekomstplan van de dienst, volop bezig met focus, ook onder meer voor camerabewaking software gekocht om beelden op intelligente manier te kunnen opvragen (vb. zoeken naar man met blauwe jas -> toont alle beelden van personen met blauwe jas).

Ethisch & Legaal

- Grens tussen gerechtvaardigde dataverzameling en privacy schending is moeilijk. Vaak pas het moment waarop het fout loopt gaan mensen meer regelgeving eisen. vb. invoering van BIN (buurt info netwerken) uiteindelijk verwatert het en gaat men dingen bekijken die niet relevant zijn vb. buurman die zijn vrouw bedriegt…, zelfde verhaal met camerabeelden. Vraag is moeten deze data dan in een dergelijk systeem belanden? Er is een wettelijk kader voor politie op vlak van informatieverzameling en inzet van bepaalde technieken. Vb. gebruik van facebook voor opsporingen, wanneer een fiets gestolen is veel kans dat men dit op FB plaatst. Hier zijn technieken om dit te gaan zoeken, maar dan zit men al tegen grens van bijzondere opsporingsmethoden wat in principe via onderzoeksrechter moet passeren. Integriteit en

deontologie zijn zaken waar mensen persoonlijk mee omspringen. Niet alle mensen volgen strikt de deontologische code, vb. agenten die zaken over kennissen opzoeken in databanken.

Knelpunten

- Predictive policing is onvoldoende evidence based. Groot risico op stigmatisering en discriminatie, bevolkingsgroepen waar meer mee in contact komt, komen ook vaker terug in databanken. Als er nog veel gerichter kan patrouilleren en toezicht houden zou dat goed zijn om meer werk te doen met minder middelen en personeel. Toezicht echter niet de hoogste prioriteit. Blinde vlekken waar politie niet vaak of niet passeert kunnen geëlimineerd worden. Zeer moeilijk om verkocht te krijgen dat men op basis van een computergestuurde recommandatie ergens moet gaan patrouilleren terwijl men op basis van eigen ervaringen misschien weet dat het niet nodig is of het anders aanvoelen. Menselijke kant van het verhaal kan je niet zomaar wegnemen. Indien het ingevoerd wordt moet er een goede implementatiestrategie zijn, verandering van werken maakt altijd een vorm van weerstand. Acceptatie van burgers, zullen ze ooit weten dat we daarmee werken? Burgers hebben vaak geen kennis van backoffice. Wel te hopen dat burgers concreet verandering zouden ondervinden als er modellen geïmplementeerd worden.

Slot

- Weinig relevante informatie voor de uitvoering van het onderzoeksproces.

Interview respondent 10

Inleidende vragen

- Weinig bruikbare informatie met betrekking tot het onderwerp.

Praktisch

- Infrastructuur onvoldoende geavanceerd om predictive policing te ondersteunen, algemene Belgische politiedatabank is hier niet op afgesteld. Op dit moment vormt predictive policing geen meerwaarde voor de dienst, zeer veel verplaatsende criminaliteit wat accurate voorspellingen heel moeilijk maakt. Bende breekt een keer in in een wijk, verplaatst zich waardoor er een aantal wekenlang gepatrouilleerd wordt waar het niet nodig is. Om technologie te integreren moet er eerst wettelijk kader zijn en personeel moet ermee kunnen/willen werken.

Toekomst

- Of het overwaait hang af van het politieke klimaat. Momenteel nog geen investeringen gepland in predictive policing technologie, hebben hier ook geen zicht op, komt vanuit hoger gelegen directie. Momenteel nog niet gebruikt omdat er een wettelijke basis ontbreekt en er nog onvoldoende praktische resultaten aan te tonen zijn die de meerwaarde van PP bewijzen. Toekomstplan i.v.m. technologie wordt ook bepaald door directie, hebben hier geen rechtstreeks zicht op.

Ethisch & Legaal

- Grens is een moeilijk debat, hangt veel af van het politieke klimaat en de op dat moment bevoegde ministers. Er bestaat momenteel geen wettelijk kader voor PP in België, haalt voorbeeld van de facial recognition aan in Zaventem. Ook veel vragen in verband met de wettelijkheid van dataverzameling, bij bv perpetrator prediction: welk soort profielen verzamel je, hoog risico op discriminatie.

Knelpunten

- Nadelen zijn geen wettelijk kader, weinig socio-cultureel draagvlak, weinig praktische resultaten aan te tonen in onderzoeken, lage bereidheid van politiepersoneel om er mee aan de slag te gaan. Kan indien de data voldoende kwaliteitsvol is patrouilles toelaten om efficiënter te werk te gaan. Schatten bereidheid van personeel om ermee te werken zeer laag in.

Slot

- Geen meerwaarde voor het onderzoek.

Interview respondent 11

Inleidende vragen

- Respondent heeft geen voorkennis van predictive policing, de term is onbekend. Respondent verteld dat ze niet voorspellen maar proberen in te schatten waar ze het meest nodig zijn. Tenslotte wordt er verteld dat ze voortdurend technologieën gebruiken, aanschaffen, … (infotheek, databanken, software in huis (analyses), tap programma's, etc. Ze zijn daarmee permanent mee bezig.

Praktisch

- Respondent geeft aan dat het zeker een meerwaarde kan vormen als men kan bewijzen dat predictive policing werkt.

Toekomst

- De respondent zegt dat het belangrijk is dat er gepeild wordt naar de outcome van predictive policing. In Nederland is er misschien wel dergelijke software daarvoor en ze lopen vaak voor in innovatie, maar vaak zien we dan dat ze zeggen het niet werkt. Als ze zeggen dat een systeem van PP werkt, dat zal het zeker overwaaien, maar als ze zeggen dat het veel geld heeft gekost en personeel, en ze komen tot conclusie, dat het niet werkt dan zal het niet overwaaien. In andere werkende moderne technologieën wordt wel in geïnvesteerd (permanent). Alles wordt gedigitaliseerd, er wordt nu met bodycams gewerkt, voortdurend nieuwe software en hardware aangeschaft, etc.

Ethisch & Legaal

- De respondent verteld dat we eerst moeten weten in hoever zo'n programma gaat, vooraleer we naar de wetgeving kunnen kijken.

Knelpunten

- De voor-en nadelen van predictive policing volgens de respondent zijn afhankelijk van de resultaten. Zijn de resultaten positief (daling criminaliteit, etc.) dan heb je alleen maar voordelen, zijn de resultaten negatief, dan heb je alleen maar nadelen. Hetzelfde voor de bereidheid van het politiepersoneel, hangt af van de werking. Werkt het goed, zal er hogere bereidheid zijn tegenover slechtere werking waar dat de bereidheid lager zal zijn.

Interview respondent 12

Inleidende vragen

- *Had u voor dit interview kennis van predictive policing?* Vroeger ermee bezig geweest, ook met mijn functie als strategisch analist, jaar 2-3 geleden, heb ik wat in verdiept in predictive police, literatuurstudie gedaan. *Heeft u kennis van "moderne" (computergestuurde) technologieën die worden gebruikt binnen de Belgische politie?* Voor PP bevinden we ons in een te kleine zone om toe te passen. Hotspots zijn we momenteel wel mee bezig, maar is moeilijk om uit te werken.

Praktisch

- *Is volgens u de technologische infrastructuur van de Belgische politie genoeg geavanceerd om PP te ondersteunen?* Moest het systeem echt effectief zijn zouden resultaten uit grote steden als New york al eerder over gevlogen zijn, waardoor wij er mee aan de slag zouden kunnen gaan binnen een grote stad als Antwerpen bijvoorbeeld. Het kan dus wel, al denk ik dat men er binnen kleinere zones moeilijker mee aan de slag kan gaan. *Denkt u dat PP voor uw politiekorps/dienst een praktische meerwaarde kan vormen?* Aangezien de kleinere zones binnen belgie is het moeilijker om dergelijke systemen in te voeren. Ik zie momenteel enkel een effectiviteit in grote steden en grote landen. *Hoe kunnen dergelijke technologieën binnen de Belgische politie het best geïntegreerd worden? (Politieopleiding/interne opleiding).* Een opleiding waarin de bedoeling van het systeem duidelijk gesteld wordt zou een goede tool zijn om politiemensen bekend te maken met pp. Vanaf het begin van de implementatie moeten positieve aspecten duidelijk in de verf gezet worden. Ook de effectieve resultaten uit buurlanden moeten meegegeven worden, zodat de effectiviteit wordt aangetoond.

Toekomst

- *Aangezien sommige buurlanden dit al in dienst hebben, denkt u dat PP ook zal overwaaien tot hier?* Als het werkt, zal het waarschijnlijk wel komen. Eerst resultaten uit andere landen bekijken, vooraleer zelf te implementeren. *Staan dergelijke investeringen al ergens op de agenda?* Eerst resultaten gaan bekijken alvorens investeringen te gaan plannen. Uit het terreur verhaal van 2016 is dit ook gebleken dat het er misschien ging komen, maar dat is er dan uiteindelijk niet van gekomen. Een light- vorm van pp rond terreur ging er bijna komen maar niet gebeurd. Min van binnenlandse zaken, justitie moet dergelijke investeringen plannen en bepalen. I police ging er budget voor vrijmaken, in 1 grote pot ging er eventueel een deel richting predictive policing gaan, ik weet niet of dit er uiteindelijk van gekomen is. *Welke soort PP denkt u dat er zal gebruikt worden moest dit geïmplementeerd worden binnen de Belgische politie? (hotspot prediction, perpetrator prediction, victim prediction)* Eerder de hotspots, omdat dader predictie botst met de privacy, … *Hoe ziet het toekomstplan er uit binnen uw politiekorps in het kader van technologie?* Doorheen de laatste jaren zijn er grote stappen vooruit gemaakt, men leert snel bij, implementeren van focus, office 365...

Ethisch & Legaal

- *Waar ligt de grens tussen gerechtvaardigde dataverzameling en privacy schending volgens u?* Eigenlijk is het afhankelijk van de ernst van de misdrijven want het is aangrijpend op de privacy. Zeker niet alle aspecten zullen zodoende in aanmerking komen voor gerechtvaardigde dataverzameling. *Bestaat er een wettelijk kader voor het gebruik van PP binnen de Belgische politie?* Specifieks nee, maar in het algemeen, deontologie van de politie, integriteit, loyaliteit. Via het comité P, COC zal er wel toezicht worden gehouden op het feit dat politie niet te ver gaat in bepaalde aspecten. *Denkt u dat PP past binnen het deontologisch kader van de Belgische politie?* Voor bepaalde fenomenen ja, het hang af van fenomenen, fietsdiefstallen ja, maar moeilijker voor topics als terrorisme, niet echt.

Knelpunten

- *Wat zijn de nadelen van PP volgens u?* Men valt snel terug op stereotypen. Focus wordt gelegd op een bepaalde wijk en bepaalde nationaliteiten, hierdoor gaat er meer gecontroleerd worden in dergelijke wijken wat de kans dan ook groter maakt dat er effectief iets gaat gebeuren. Met kans dat er in een andere wijk een erger delict gebeurt wat niet te voorspellen was. (Self fulfilling prophecy) *Wat zijn de voordelen van PP volgens u?* Je kan de politie gericht op pad sturen, zodat er niet doelloos rond gereden wordt. *Hoe hoog schat u de bereidheid van het politiepersoneel om 'predictive policing' te gebruiken?* Beperkte bereidheid, stel dat het ook ooit komt, zal men rekening moeten houden met de eisen van de vakbonden ("gaat dat niet te ver?"), ... *Wat is uw mening omtrent de acceptatiegraad van de burgers, indien dit soort technologie naar België overwaait?* Nog een stap slechter dan het politiepersoneel (privacy en ethische waarden).

Slot

GDPR-wetgeving zeker bekijken.

Graag inzicht in de resultaten van ons onderzoek