SUMMARY

POLICY PAPER ON THE CITY OF MONTRÉAL'S USE OF AUTOMATED DECISION SYSTEMS: ENSURING RESPONSIBLE, FAIR AND INCLUSIVE GOVERNANCE

CONSEIL JEUNESSE DE MONTRÉAL

Montréal

This document is an English-language summary of a policy paper prepared in 2020 and 2021 and adopted by the **CjM's** members on May 26, 2021. The full policy paper, in French, can be found on the **CjM's** website.

c
j
m

CONSEIL JEUNESSE DE MONTRÉAL
1550, rue Metcalfe, bureau 1424
Montréal (Québec) H3A 1X6
Tel.: 514 868-5809
cjm@Montréal.ca
www.cjmtl.com

LEGAL DEPOSIT
Bibliothèque et Archives nationales du Québec

ISBN 978-2-7647-1830-8 (print version)
ISBN 978-2-7647-1831-5 (electronic version)

Research for this policy paper was completed on February 3, 2021.

Printed on recycled paper

CONSEIL JEUNESSE DE MONTRÉAL

The Conseil jeunesse de Montréal (CjM) is an advisory committee created in February 2003 by the Montréal municipal administration. Through its creation, the city sought to improve its response to the concerns of Montrealers aged 12 to 30, and to encourage young residents to take part in the decisions that affect them.

Composed of 15 members representing the geographic, linguistic, cultural and social diversity of Montréal's youth, its mandate is to regularly advise the Mayor and the Executive Committee on all youth-related issues and to ensure that youths' concerns are taken into account in the decisions of the municipal administration.

MEMBERS

Myriam Boileau
Jessica Condemi
Rime Diany
Yazid Djenadi
Pascal-Olivier Dumas-Dubreuil
Sherlyne Duverneau
Benjamin Herrera, president
Rizwan Ahmad Khan
Gabriel Laferrière
Audrey-Frédérique Lavoie, vice-president
Xiya Ma
Alice Miquet
Pentcho Tchomakov, vice-president
Shophika Vaithyanathasarma
Michael Wrobel

POLICY PAPER COORDINATOR

Geneviève Coulombe, secretary-researcher

RESEARCH AND WRITING

Lyne Nantel

COPYEDITING (FRENCH)

Edith Sans Cartier

TRANSLATION

Nicole Kennedy

COPYEDITING (ENGLISH SUMMARY)

Michael Wrobel

GRAPHIC DESIGN AND ILLUSTRATION

Diane Morin

TABLE OF CONTENTS

c
j
m

GLOSSARY

All words marked with an asterisk (*) in the text can be found in this glossary.

Datafication: the process by which everyday subjects, objects, and activities are transformed into numerical data to generate value, correlations, and inferences.

Dataveillance: **surveillance via digital data.** The omnipresent nature of data and connected objects enables continuous monitoring.

Anonymized data: information that can no longer identify the person concerned, directly or indirectly, **in any way,** and this, in an **irreversible manner.** The link between the individual and the identifying codes that replace their personal information is destroyed. Anonymized data can still be used for specific purposes.[1]

Biometric data: data derived from biometrics, which refers to the set of techniques used to analyze **one or more unique characteristics of a person** (physical, behavioural or biological) in order to determine or prove his or her identity. There are three main categories of biometrics:

- Morphological biometrics: based on the identification of particular physical traits. It includes, but is not limited to, fingerprint, hand shape, face, retina and iris recognition;
- Behavioural biometrics: based on the analysis of certain behaviors, such as the tracing of a person's signature, vocal pattern, gait, way of typing on a keyboard, etc.;
- Biological biometrics: based on the analysis of a person's biological traces, such as DNA, blood, saliva, urine, odours, etc.[2]

Depersonalized data: information that no longer directly identifies the individual, but for which a record is kept of the link between the individual and the identification codes that replace his or her personal information (these are encrypted or encoded).

False positive: error in the outcome of a decision, which causes an algorithm to assign a match where there is none. For example: the erroneous identification by the algorithm of a match between two faces.

Digital sovereignty: refers to the application of the principles of sovereignty to the field of data and technology, at the individual and territorial level. Digital sovereignty ensures the ability to act in digital space.

Automated decision system: system composed of data and algorithms whose function is to help, assist or replace human decision-making.

Digital traces: information in the form of data that a digital device records regarding users' identity and activities: Web browsing and social networking, online shopping, use of smart cards (e.g. Opus card), etc.

1. Gouvernement du Québec, 2020a.
2. CAI, 2020a.

ACKNOWLEDGEMENTS

Céline Castets-Renard
Professor, Faculty of Civil Law, University of Ottawa Research Chair on Accountable Artificial Intelligence in a Global World

Dominic Cliche
Ethics Advisor, Commission de l'éthique en science et en technologie du gouvernement du Québec (CEST)

Johanne Dion
Member, Montréal pour tous Coordinating Committee

Pierre-Antoine Ferron
Digital governance specialist, B.A., D.A.P. (ENAP), M.A.P. (ENAP)

Sarah Gagnon-Turcotte
Strategy, public policy and data governance professional

Richard Grenier
Director, Service des technologies de l'information, Ville de Montréal

Stéphane Guidoin
Director, Laboratoire d'innovation urbaine (LAB), Ville de Montréal

Anne-Sophie Letellier
Doctoral candidate, École des médias de l'UQAM, co-founder of LAB 2038

Anne Pineau
Activist, Ligue des droits et libertés

Richard Shearmur
Urbanist, member of the Ordre des urbanistes du Québec, member of the Canadian Institute of Planners, professor and director, McGill University's School of Urban Planning

Marie-Christine Therrien
Co-director of the public debate division of the International Observatory on the Societal Impacts of AI and Digital Technology (OBVIA), professor and director, Cité-ID Living Lab in Urban Resilience Governance, ENAP

Nathalie Torres Parent
Ethics Advisor, Commission de l'éthique en science et en technologie du gouvernement du Québec (CEST)

Pierre Trudel
Professor, Faculty of Law, Université de Montréal

INTRODUCTION[3]

For more than a decade, the "smart city" has been dominant in terms of how cities see themselves and approach their strategic development.[4] This umbrella term with multiple origins[5] is not associated with a particular urban model. In general, a smart city is characterized by the use of technology and data to improve efficiency, service planning and delivery, and infrastructure management.[6] The growing support for the smart city model also stems from the widely accepted notion that progress and solutions to tomorrow's urban challenges are to be found in the data collected by connected objects and in the technologies that enable their analysis. Consequently, such technologies must address issues related to climate change, security, inequalities, mobility, etc. Given the possibilities and promises associated with their use, many public and private players are showing marked interest in deploying them in the urban sphere.

Since 2014, the City of Montréal has based its development on a smart city approach.[7] Winner of Infrastructure Canada's Smart Cities Challenge in 2018, it plans to leverage artificial intelligence (AI) to make sense of big data.[8] As François W. Croteau, the elected official responsible for the smart city at the City of Montréal, has pointed out, we must "implement a culture of decision-making based on data and facts, and thus make better decisions."[9] Montréal is no exception to the trend, and the city has embarked on a "major digital" shift where «data plays a key role in [its] ability… to respond to the many challenges [it] faces."[10]

In the urban environment, new digital and data-driven technologies, particularly those based on artificial intelligence, create the possibility of processing masses of information in real time to optimize the city's operation and planning. These technologies have multiple applications, including sensors for optimal traffic light management, software for automated permit issuance, tools for managing garbage collection, and more. Data-driven technologies are thus used as decision support tools. Urban mobility planning using transportation applications (Transit, Google Maps, Waze, etc.) is only one example of how they are used.

Data-driven technologies and AI are also being hailed as beneficial to public safety in urban environments. Today, many municipal police departments in Canada and around the world are using crime prediction software to determine policing strategies. To complement these methods, more and more police forces are using (or seriously considering) new algorithmic technologies—combined with AI—that provide sophisticated surveillance capabilities by automating the collection and processing of online data, such as data from social networks, or biometric data using facial recognition technologies.

3. Note: In this statement, we have provided English translations for all citations from works published in French.
4. Kitchin, 2015; Townsend, 2013.
5. Breux and Diaz, 2017.
6. Scassa, 2015.
7. Ville de Montréal, n.d. a.
8. Normandin, 2019, 19 March.
9. Normandin, 2019, 19 March.
10. Ville de Montréal, 2020.

THE INTERCONNECTED CITY

The growing integration of all kinds of connected objects and constantly expanding data and data processing capabilities are spurring the development of new uses and ways of doing things that can serve very different purposes. For example, data-driven technologies enable service personalization through consumer profiling (micro-targeting and categorization into profiles). Content suggested by search engines are examples of this. Data-driven technologies are also being used to rank and select job applicants, and to control access to buildings, automatically manage wastewater treatment and monitor traffic and individual movements in real time. The fields of application are vast.

Data-driven technologies are thus significantly changing the decision-making process. As sociologists Benbouzid and Cardon point out, in addition to promising service optimization, these forms of prediction assisted by powerful algorithms set up "a new regime of anticipation that affects decision-making processes.[11]

Another aspect of the data era worth noting is the exploitation of digital traces,* i.e., data produced automatically or intentionally through digital activities and the use of connected objects. The accumulation of digital traces and data in general increases the potential for data-driven surveillance.* This phenomenon is called *dataveillance*.[12]* The new ways in which data is being gathered and used are having an impact on the capacity to engage in direct and indirect information monitoring. "Data-driven surveillance" should be understood broadly; it refers to a focus on data for the purposes of management, protection, influence and guidance.[13]

Cities' harnessing of data-driven technologies in the management, planning, and delivery of public services raises multiple issues related to privacy, bias and discrimination, effectiveness, added value, review, and oversight.

The policy paper that is the subject of this summary seeks to be part of the ongoing discussion on the use of data-driven and algorithmic technologies by the City of Montréal, associated agencies, paramunicipal bodies and security services as decision support tools. In concrete terms, the aim is to study the impacts of these technologies' use and to reflect on the development of a plan for the oversight, regulation and governance of these systems. The objective is to provide actionable insights to guide implementation of a responsible governance framework for data and data-driven technologies.

Specifically, the policy paper focuses on **automated decision systems*** (ADS) as technological tools composed of data and algorithms whose function is to aid, assist, or replace, as appropriate, human decision-making.[14]

11. Benbouzid and Cardon, 2018.
12. Van Dijck, 2014.
13. Lippert, 2008.
14. Treasury Board of Canada, 2019.

ANALYSIS OF AUTOMATED DECISION SYSTEMS

Here, a clarification concerning the subject of this policy paper is necessary. We chose to examine the notion of automated decision system rather than artificial intelligence as such because AI is imprecise and there are many debates about how to define it. The other term for decision support technologies is “algorithmic technologies.” Compared to this last term, the notion of ADS seems more complete since it refers to the data, algorithms and results obtained by data processing. **Using the system approach, we can explore these technologies in a comprehensive way.**

To facilitate an understanding of the issues and social impacts associated with ADS deployment, Chapter 1 defines data-driven technologies by identifying their components and summarizes how they have developed. This effort to define, which is necessary to ensure a quality public debate, is preceded by an overview of the applications of data technologies. Chapter 2 presents the different uses of ADS by cities, with a focus on police departments. Chapter 3 highlights all the social, ethical and legal issues and the questions these technologies raise for public organizations. Chapter 4 discusses the legal frameworks (provincial and federal) concerning the use of personal data and proposals for their modernization. This chapter also raises questions regarding the principles intended to guide the regulation and responsible governance of technologies. Chapter 5 focuses on the powers and means available to the City of Montréal and provides a portrait of commitments made to date and the road ahead. Finally, to provide food for thought, Chapter 6 examines initiatives taken by North American and European cities. In addition to a brief review of the policy paper, the conclusion presents recommended actions intended to regulate the use of data and data-driven technologies.

CHAPTER 1

DEFINITIONS AND EVOLUTION OF DATA-DRIVEN TECHNOLOGIES

The digital world and the ubiquity of data-driven technologies such as sensors and connected objects have driven the development of the data economy. This in turn has strongly oriented all data production and development systems. The growth of digital technology has thus spurred societies to organize around the phenomenon of datafication,[15]* or the expression of human activities in data form.

BIG AND VARIED DATA

Continuous production of digital data generates a veritable information explosion: megadata, or *big data*. As the name implies, big data is massive; it is produced continuously and in real time, and is extremely varied. It comprises data on the habits, behaviours and interests of individuals, which are known as "digital traces."* Generally, these data do not directly identify an individual, but cross-referencing via algorithms can lead to identification.

Big data also includes personal information, i.e. information about an individual that can be used to identify him or her.[16] In Québec, this information is protected by law and, with some exceptions, cannot be disclosed without the consent of the person concerned. Any personal information may be de-identified or anonymized.[17] These processes allow for personal information to be used while minimizing privacy risks. However, several studies have pointed out the limits of such procedures, demonstrating that one can often re-identify individuals by cross-referencing certain information.[18] These limits raise important questions about the protection of privacy, but even more so about the regulation of non-directly identifiable data, which escape the current legislative frameworks.[19]

Personal information also includes biometric data,* which has exploded in recent years. Indeed, the development of affordable biometric technologies has favoured their integration "as a simple and practical means to achieve many purposes (employee time control, identity verification, access to premises, etc.)."[20] As personal information, biometric data* is particularly sensitive, since it represents a **permanent** and **distinctive** characteristic of an individual. In other words, biometric data are **unique identifiers.** They may also reveal other personal information about an individual, such as ethnic origin.

ALGORITHMIC DATA PROCESSING

Due to the volume and variety of digital data, algorithms have become indispensable tools for classifying, identifying, comprehending, and even making predictions and recommendations from the available information flow. They also have the ability to "learn," in the sense that they adapt to the digital inputs provided to them.

In addition to being powerful computational tools, algorithms establish links and deductions from the data that feed them, thus increasing inference capabilities tenfold. Because of their place and function today, they are **data interpretation tools.** With the ability to process masses of data, sometimes via extremely complex calculations, algorithms are playing an increasingly important role in decision-making.

15. Van Dijck, 2013.
16. Gouvernement du Québec, 2020b.
17. See "de-personalized data*" and "anonymized data*" in the glossary.
18. Rocher, Hendrickx and de Montjoye, 2019.
19. CEST, 2020b.
20. CAI, 2020a.

However, the growing complexity of algorithmic models makes them more and more opaque, which impedes the comprehension of their functioning and the intelligibility of the results obtained. Consequently, understanding the impacts of algorithms, especially on the technologies that are used to support decision-making, is an arduous and complicated endeavour.

AUTOMATED DECISION SYSTEMS AS DECISION SUPPORT TOOLS

Together, digital data and algorithms form **automated decision systems*** (ADS).[21] This is the generic term used to designate the technological systems under study in the policy paper summarized here. ADS are technological tools that **help, assist or replace, depending on the case, human decision-making.**[22] They come in the form of software, connected objects and robots.[23]

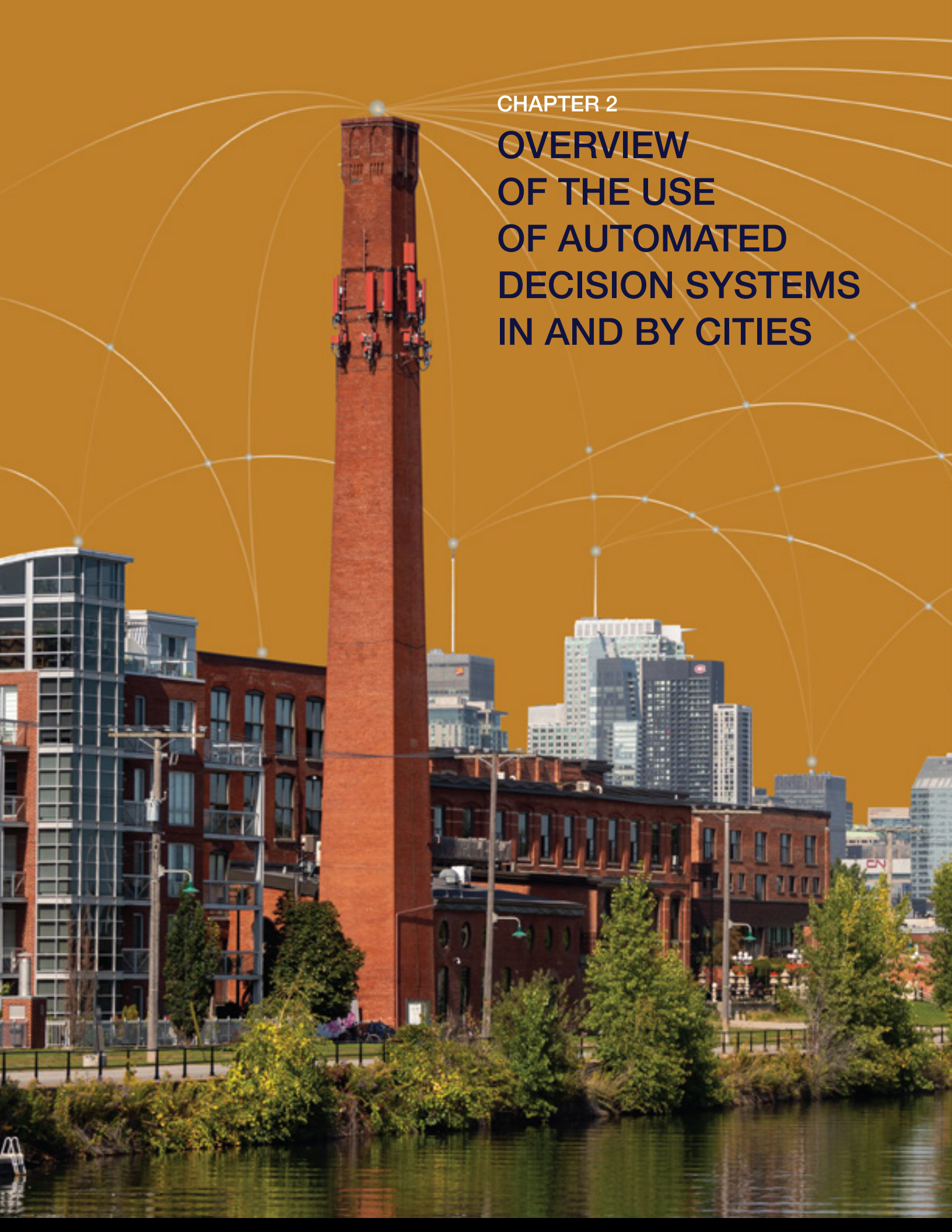
ADS is increasingly being used in diverse fields including justice, finance, insurance, policing, education, housing and welfare to generate scores, predictions, identifications, classifications or recommendations for action.[24]

Another purpose for ADS is service development and improvement: to perform recruitment tasks, optimize energy consumption, predict criminal offenses, etc. As decision support tools, ADS can have different consequences depending on the reasons and contexts of use. Many questions and issues surround automated support for decision-making, especially in contexts where decisions concern individuals.

UNDERSTANDING THE IMPACT OF THESE TECHNOLOGIES

Given the proliferation of connected objects and their rapid implementation in cities' operations, and more generally in everyday actions, it is important to understand the role and impacts of these data-driven technologies. As big data and algorithms become ubiquitous and are used to optimize both urban services and resource management, understanding how they work becomes essential. The use of ADS by municipal governments raises questions of legitimacy and accountability for the decisions that are made,[25] as well as issues related to privacy and human rights.

21. Equivalent term: automated decision-making.
22. AI Now Institute, s. d.
23. Déclaration de Montréal pour un développement responsable de l'IA, 2018.
24. AI Now Institute, 2019.
25. Calo and Citron, 2020.



CHAPTER 2

OVERVIEW OF THE USE OF AUTOMATED DECISION SYSTEMS IN AND BY CITIES

Cities turn to technological solutions seeking efficiency and resource optimization for service delivery. The technologies that support decision-making are very diverse. They include real-time processing of traffic images using sensors, automated prioritization of online service requests, and crime prediction technologies. Since the integration of data-driven technologies for service delivery and general city operations is a very broad field, for ease of understanding, we will group technologies that optimize city services and administration on the one hand, and technologies that are used by city police departments on the other. It is difficult to provide an exhaustive list of the technologies used by cities, so we will provide an overview of their applications, focusing on those that raise the most pressing ethical and social questions.

THE CITY AS A TEST BED FOR TECHNOLOGIES

Technological solution development can be expensive and requires specific technological expertise. As a result, cities often have to rely on technology companies. For many of these companies, cities constitute environments of interest for testing their technologies.

SENSORS AND CONNECTED OBJECTS IN URBAN SPACE

Use of sensors and connected objects varies depending on the city, project, needs and partners involved. In Canada, the best known hyperconnected neighborhood project is certainly the **Quayside** neighborhood in **Toronto**, led by the Sidewalk Labs subsidiary of the corporate giant Alphabet (owner of Google). The project, which was abandoned in 2020, proposed integrated resource and service management via data and technology.

Many cities are developing technological innovation districts. Montréal is no exception, with the **Quartier de l'innovation (QI)**, where the Laboratoire à ciel ouvert de la vie intelligente (LabVI) is located. The experimental district involves business and academic partners and is supported by the governments of Canada and Québec and the City of Montréal. Among the projects currently being tested at LabVI is a smart bus shelter that aims to develop "functionalities [that] will allow a better understanding of human interaction with urban infrastructure."[26] This project integrates ADS and sensors, and is distinguished by its use of biometric technologies (analysis of facial expressions).[27]

In addition to specialized zones such as innovation districts, cities are conducting technology experiments, usually in the form of pilot projects, as a prelude to broader deployment. Ad hoc experimental projects are also carried out in response to an immediate need. The **coronavirus (COVID-19) pandemic**, declared by the World Health Organization in March 2020, has led several municipal administrations to adopt technology to enforce health regulations (physical distancing, wearing masks, curfews). The City of Amsterdam in the Netherlands has used sensors that calculate physical distance between individuals.[28] Cannes, France, tested image recognition devices to monitor mask compliance.[29] In Italy, the City of Trevilo has deployed drones equipped with thermal sensors to identify people who are defying the lockdown.[30]

26. QI, 2019, 9 February.
27. Halin, 2018, 29 September.
28. City of Amsterdam Algorithm Register Beta, s. d.
29. Laurent, 2020, 29 April.
30. AFP, 2020, 10 April.

Outside of these particular contexts, all cities engaged in the digital shift are testing software and using more and more connected objects and sensors. These experiments are intrusive to the public in varying degrees, in some cases threatening privacy and respect for human rights. Some Asian cities, for example, are deploying biometric recognition technologies to control access to transportation services.[31]

While few municipal public agencies are using biometric recognition technologies to date, there are a number of pilot projects involving sensors and automated readers that have the potential of transmitting sensitive information. For example, Montréal, assisted by Panavidéo,[32] is currently testing crowd density sensors. However, at present, little information is known to the public about the nature of the images captured, their processing and storage.

Another example: the City of Montréal recently launched a "smart parking" pilot project incorporating automatic number-plate recognition (ANPR). This technology not only identifies a vehicle, but also records other data, such as the location of the vehicle at a specific time. This kind of information collection could pose security and privacy risks. On its website, the city's sustainable mobility agency states that it handles "all data collected in a secure, ethical and transparent manner, in compliance with the Privacy Act."[33] But despite the risks with regard to personal data, the description of the pilot project does not provide any specific information about its processes for data collection, processing and sharing.

SOFTWARE INTEGRATED INTO INTERNAL OPERATIONS

In addition to the multiple sensors and connected objects used to manage public spaces and services, cities are increasingly implementing software as automated data processing tools. Examples include software that classifies and prioritizes online citizen requests, enables automated permit issuance, and sorts applications for a competition or job. Some cities are also using decision support tools for resource management and action prioritization in an effort to better support people experiencing homelessness; examples of such tools include the Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT)[34] and Chronic Homelessness Artificial Intelligence Model (CHAI).[35] The goal of adopting these tools is to optimize the use of human resources and to accelerate decision-making, notably by automating certain tasks.

There are countless application areas for decision support technologies in public services and municipal administration. However, their uses are not usually well known.

POLICING AND TECHNOLOGY

The use of big data and algorithmic technologies is paving the way for new policing methods, such as technology-assisted prediction and surveillance. These technologies can speed up emergency services' response times and there is great promise of increased security and greater efficiency in the fight against crime.[36] Moreover, one argument in their favour is that the use of technology could limit the role of human judgment—including discriminatory biases—through data-driven calculations.[37]

31. Trujilo, 2019, 23 September.
32. Normandin, 2019, 15 October.
33. Agence de mobilité durable Montréal, n.d.
34. This software is used in American and Canadian cities.
35. The City of London, in Ontario, developed and used CHAI.
36. Castets-Renard *et al.,* 2019.
37. Bakke, 2018.

Crime rates—whether they are high or low—and public safety are issues that no city government can ignore. Security in urban environments is also a very lucrative sector for corporate actors, especially technology companies looking for new markets to expand into or in which to test and deploy their devices.[38] This booming market includes technology giants such as IBM, defense companies such as Thales and Palantir, crime prevention companies such as PredPol, as well as start-ups, especially in the field of facial recognition technologies.

However, some cities prefer not to use external companies or solutions purchased on the market, and will develop their own data processing software to increase efficiency. Since the software is developed in-house, one might assume that it is easier to obtain information about its design, operation and functionality. However, studies of decision support systems used by police departments have shown us that this is not the case.

PREDICTIVE TECHNOLOGIES – PREDICTIVE POLICING

"Predictive policing" is the name given to technological tools whose objective is to predict where a crime will be committed or to assess the risk of an individual committing a criminal act. Essentially, predictive policing tools are distinguished by whether they **target locations** or **individuals.**

- **Location targeting:** these programs "predict" where and when a crime will occur by aggregating past data. PredPol software and the GeoDASH software developed by the City of Vancouver are now being used for this purpose.
- **Targeting individuals:** These programs target people who are likely to be involved in a crime. For example, Palantir's software allows for the identification of offenders and the creation of suspect files[39] by cross-referencing information from several sources, including social networks.

The applications of this software are multiple. These predictive tools are used by municipal police forces in the United States, Canada, Europe and elsewhere in the world. In the United States, the market for commercial predictive policing software is largely dominated by PredPol and Palantir. However, the speed of implementation of these decision support technologies differs from city to city and country to country, based on their socio-political and legislative contexts.

SURVEILLANCE TECHNOLOGIES

The use of computer software and algorithmic technologies with surveillance cameras now makes it possible to identify objects and movements through automated processing, and also, to identify sounds and individuals. Real-time recognition tools are increasingly being integrated in a systematic manner into new smart surveillance devices and connected objects distributed across urban spaces. Among the surveillance technologies are:

- **Sound sensors (audio surveillance):** Used to detect abnormal noises (gunshots, glass breakage, screams, etc.). In addition to identifying noises, algorithms can determine their spatial origin.

38. Institut d'aménagement et d'urbanisme, 2019. In December 2019, Globe Newswire reported that the policing modernization market would represent $59.9 billion by 2025. Palantir attained a market value of $22 billion in October 2020.
39. Leloup, 2018, 9 October.

- **Automatic Number-Plate Recognition (ANPR):**[40] Identification of vehicles and their owners. Automatic license-plate readers have multiple functions. They can detect speeding and issue tickets automatically, without a traffic stop. Depending on their settings, they can also record other information, such as position and direction. They are used by many municipal police departments, including Montréal's police service (SPVM) since 2012;
- **Biometric recognition technologies:** these tools make it possible to authenticate a person by confirming his or her identity, to spot an individual (e.g., in a crowd) or to analyze individual personal characteristics.[41] Surveillance cameras increasingly offer a facial recognition function. In Canada, the Calgary Police Service[42] was the first to implement NeoFace Reveal technology, distributed by the NEC Corporation of Japan. More recently, several Canadian police departments have acknowledged using Clearview AI's facial recognition software.[43]

FRAGMENTARY INFORMATION

Even if one identifies the main software vendors supplying these technologies to police departments in North American and European cities, it remains difficult to determine with certainty which municipal police departments are using them and under what conditions. For example, the SPVM has been using ANPR technology for nearly a decade, and it was only recently that Montréal's city council gave the Commission sur la sécurité publique de Montréal, the committee of elected officials that oversees the city's emergency services, the mandate to study the SPVM's use of ANPR technology.[44] The joint investigation into the use of Clearview AI technology led by the Office of the Privacy Commissioner of Canada (OPC), the Commission d'accès à l'information du Québec (CAI), the Office of the Information and Privacy Commissioner of British Columbia (OIPC-BC) and the Office of the Information and Privacy Commissioner of Alberta (OIPC-Alberta) also testifies to the opacity surrounding law enforcement's use of such data-driven technologies.[45]

However, this lack of transparency is not limited to technologies used by municipal police departments. Whether we're looking at sensors to improve on-street parking management, smart bus shelters or software to prioritize citizen requests, it remains unclear when the technologies are being used, by whom and how. What data is being collected and how is it processed? This brief overview of applications of data-driven technologies illustrates just how complex it is to assess their implementation.

As we can see, many grey areas exist when it comes to technologies and their purpose. Yet their integration is too rarely questioned, due to the widespread perception that technological systems are neutral, pragmatic and apolitical.[46] Our overview of ADS, however, has demonstrated that these technologies' multiple operation modes are, to varying degrees, intrusive and troubling.

40. This is the same technology as that used for the smart parking pilot project conducted by the Agence de mobilité durable Montréal.
41. CEST, 2020a.
42. CBC News, 2014, 3 November; The City of Calgary Newsroom, 2014, 3 November.
43. CPVPC *et al.,* 2021.
44. Champagne, 2019, 20 August.
45. Clearview AI uses algorithms to extract images from the Web and social media. Using this method, it has created a database comprising nearly 3 billion images (Hill, 2020, 18 January). In February 2020, after a widely publicized theft of data at Clearview AI and troubling revelations concerning the legitimacy of the company's database, a joint investigation was launched to determine whether the collection, utilization and communication of personal information by Clearview AI via its facial recognition application conformed with federal and provincial legislation regarding the protection of personal information in the private sector (CPVPC et al., 2021). The investigation revealed that 48 police forces and governmental agencies connected with Canadian national security infrastructure had used Clearview AI services via trial accounts.
46. Gómez, 2020; Kitchin, 2016.

CHAPTER 3

THE CHALLENGES AND IMPACTS OF DATA-DRIVEN TECHNOLOGIES

In their role as decision support systems, data-driven technologies present varying levels of impact/risk of harm. The lack of transparency surrounding ADSs raises important social, ethical, legal and political questions. Adherence to these new technologies, especially by the public sector, is particularly problematic because democratically elected governments have duties of accountability and because all decisions made with the assistance of an ADS can have consequences for the population.[47]

The list of factors to consider when evaluating technologies is extensive. It is important to take into account their design and objectives, their features and internal functioning (data used, shared and stored), the quality of the data, their context and conditions of use, presence or absence of a regulatory framework, training and knowledge of the individuals using them, etc.

CONTESTED EFFICACY, UNCERTAIN RELIABILITY AND RISK OF ERROR

Integration of an ADS into public sector management and decision-making raises questions about the benefits and risks involved.

The overview of technological solutions used by cities reveals a lack of transparency, which makes it difficult to evaluate their effectiveness through external and independent studies. Moreover, the difficulty of accessing the data and algorithm source codes is another obstacle to evaluating the real effects of these technologies. Under these conditions, simply questioning a supplier's estimated error rate, for example, could be a major feat. In fact, the overall level of effectiveness of proposed solutions becomes impossible to estimate.

The reliability of some automated decision systems is another limitation that undermines the technologies' anticipated impact. Several factors can decrease the reliability of an ADS. These include complexity and, especially, the quality of inputted data. Various studies and research have shown a significant error rate in biometric recognition technologies. For example, an independent report by the University of Essex on the NeoFace recognition software used by the London Police Service—and Canadian police forces—claims an 81% error rate, a far cry from the developers' claim of a 0.1% margin of error.[48]

Software reliability and internal validity is quickly compromised when it is based on incomplete, decontextualized and sometimes biased datasets. Software that generates lists of potential criminals and at-risk individuals is prone to this type of error. Once on these lists, it is difficult for an individual to be removed, and the lists are rarely updated or revised, as Ferguson points out.[49]

The limited effectiveness and reliability of ADSs have real consequences: inaccuracy increases the risk of coercive actions being taken against citizens and harm to innocent people. **In addition to spending money on systems and software that have not always been proven to work, overly optimistic perceptions of technology can lead to solutions that do not take into account the complexity of social phenomena such as crime and homelessness.**

47. Brauneis and Goodman, 2018.
48. Fussey and Murray, 2019; Manthorpe and Martin, 2019, 4 July.
49. Ferguson, 2017.

BIAS, DISCRIMINATION AND EXCLUSION

The use of technology in decision-making is based on the argument that automated and algorithmic processing is a guarantee of greater rationality. In other words, ADSs would avert the voluntary or involuntary exercise of discretion. Technological systems are not neutral, however. They are influenced, among other things, by program designers, the data that are collected and serve as raw material to produce results, and contexts of use.

The lack of precision and accuracy of some ADSs therefore causes harm, with a disproportionate impact on certain individuals and groups. Several studies and reports show that algorithmic injustices disproportionately affect minority groups and racialized people.[50] The National Institute of Standards and Technology in the United States reported significant racial bias among 189 biometric recognition software products they evaluated, from 99 companies. The reference image bank used for the study included 18 million images representing 8.5 million Americans. Misidentification (false positives*) was 10 to 100 times more common in the case of Black and Asian people than white people.[51] The false positive rate was also higher with women's faces.[52]

Incompleteness and bias in the data fed into ADSs results in the reproduction of existing discriminatory biases.[53]

Moreover, data quality is not the only factor influencing the results of decision support systems: the type of data that is inputted is decisive, as is the choice of location for sensors. Whether it is the types of crimes PredPol selects as historical data or the installation of sound sensors in some areas rather than others, **these decisions reinforce disparate treatment and discrimination against certain groups and communities.[54]** Researcher Virginia Eubanks also notes that discriminatory bias could be countered by ensuring that users of decision support software understand the inputted data and how it is processed.[55]

Biased systems engender unfortunate social and legal consequences. Indeed, there is a real risk that these technologies will undermine the rights to non-discrimination and equality protected by the Canadian and Québec charters of rights and freedoms. These shortcomings must be taken into consideration by public authorities when using decision support tools. In this regard, both the City of Montréal and the SPVM have acknowledged the presence of systemic bias and racism within their administrations, which is reflected in their data banks. In these circumstances, the use of decision support technologies carries with it a clear risk of replicating, feeding, or masking already existing biases.

INFRINGEMENT OF PRIVACY AND BREACHES

Any collection of personal data and images in public spaces heightens the risk of infringement on privacy rights and of privacy breaches. The risks are all the greater since, with algorithms and the presence of a mass of information, data—even when previously anonymized*—can easily be transformed back into personal information.[56] In addition, even if the data collected does not fall into the category of personal information, its aggregation through algorithms may turn it back into identifiable data, thereby compromising privacy.

50. Lynch, 2020.
51. Grother, Ngan and Hanaoka, 2019; Singer et Metz, 2019, 19 December.
52. Berkeley, Boston, Somerville and San Francisco have recently instituted measures to regulate the use of facial recognition applications, without formally prohibiting it.
53. Richardson, Schultz and Crawford, 2019.
54. Hill, 2016, 20 October.
55. Eubanks, 2018.
56. Gautron, 2019; Observatoire international sur les impacts sociétaux de l'IA et du numérique, 2020; Rocher, Hendrickx and de Montjoye, 2019.

Given the pace at which data-driven technologies are developing, it is clear that better and clearer guidelines must be established to regulate the multiple processes by which data is collected, processed, used and stored. Both provincial and federal laws governing personal information must be reviewed to meet the challenges of increasing digitization. The Privacy Commissioner of Canada, Mr. Daniel Therrien, states that there is an urgent need to modernize the methods for protecting privacy rights.[57] The Commission de l'éthique en science et en technologie du gouvernement du Québec (CEST) also believes that there is a need to review the framework for the use of personal information and digital data collection in general.[58]

INFRINGEMENT OF FREEDOMS OF EXPRESSION, BEHAVIOUR, ASSOCIATION AND FREE MOVEMENT

One of the major findings concerning the inference, recommendation, identification and recognition capabilities of current technologies is that we are witnessing an intensification of surveillance, which is becoming more and more extensive and continuous. Several reports have pointed out that increased technological surveillance threatens our freedoms of expression, association and free movement.[59] For example, the use of automatic number-plate recognition (ANPR) around a place of worship could be detrimental to the rights of association and religion. In public spaces, the freedom to move anonymously must be guaranteed to every individual.

RISKS RELATED TO PARTNERSHIPS WITH PRIVATE COMPANIES

The overview of technologies and their uses highlights the strong presence of public-private partnerships in this sector. Many technology companies specialize in ADSs for law enforcement. Partnerships with the private sector are not just for the security and police sector, however: the digitization of cities makes this type of collaboration even more common. The Sidewalk Labs project in Toronto and LabVI in Montréal are examples.

These relationships between the public and private sectors raise a number of issues related to software and data ownership and the independence of public agencies from external suppliers who represent important sources of technological expertise for municipalities.

Another question that arises is whether these partnerships are actually in the public interest. With respect to the **smart bus shelter** project, for example, it is relevant to ask if the public interest is actually being served by installing automated mood recognition technology to improve transit quality and whether the use of this technology is justifiable and acceptable in a public space.

LACK OF TRANSPARENCY

In the field of digital and technological innovation, we often have to wait for controversies to arise before we fully understand the consequences of the use of new technologies. In the Clearview AI case, it was only after controversial revelations about the nature of the company's facial recognition technology that Canadian police services publicly acknowledged they had been using the software. Moreover, the revelations showed that facial recognition technology may have been used without formal authorization and without the knowledge of city or law enforcement officials, and therefore without public debate.

57. CPVPC, 2019.
58. CEST, 2020b.
59. Castets-Renard, 2020; Citizen Lab, 2020.

The lack of transparency in police surveillance practices is regularly denounced. In the Citizen Lab/University of Toronto report on the use of predictive policing technologies in Canada, three reasons are given for the difficulty in accessing information: 1) lack of transparency on the part of law enforcement; 2) delays and barriers in the access-to-information process; and 3) the ability of police forces to withhold information by claiming that their methods mustn't be revealed publicly.[60]

Regarding the use of facial recognition technologies by the SPVM, elected officials of the City of Montréal and the Commission de la sécurité publique had to wait six months before obtaining answers from the city's police force.

Without transparency, that is, without a complete picture of the technological systems and data used by cities, including all municipal organizations, it is impossible for the public and researchers to assess their often underestimated impacts and participate in a responsible, fair and equitable deployment.

60. Citizen Lab, 2020.

CHAPTER 4

GUIDING FRAMEWORKS AND EXPLAINABILITY: KEY PRINCIPLE OF RESPONSIBLE GOVERNANCE

ONGOING MODERNIZATION OF EXISTING LEGISLATIVE FRAMEWORKS

In the digital age, there is a clear consensus that legislative frameworks, both provincial and federal, are outdated and do not adequately protect people's privacy and rights. Legislative reviews are currently underway, including the Québec government's introduction of Bill 64 (PL64), entitled *An Act to modernize legislative provisions as regards the protection of personal information*, which affects the public and private sectors. At the federal level, Bill C-11, *the Digital Charter Implementation Act, 2020*, which deals with the private sector's responsibilities with regard to the protection of privacy and personal information, will impose new obligations on businesses. It was tabled in November 2020.

These two bills highlight the need for changes to legal frameworks and the priority that data protection represents at both the provincial and federal levels. Both propose many changes concerning consent, de-identification and anonymization of personal information, transparency and accountability, among others.

To date, several organizations and researchers have pointed out the bills' limitations. As the Commission d'accès à l'information du Québec (CAI) has commented, PL64 provides no guidance on several issues related to AI and biometrics.[61] Furthermore, the bills are limited to privacy protection; as they currently stand, the proposals are thus inadequate in terms of fully safeguarding human rights. Both of these bills are still under consideration and it will be important to monitor the progress of any amendments.

FROM TRANSPARENCY TO EXPLAINABILITY AS A GUIDING PRINCIPLE

The opaqueness of the technologies requires not only greater transparency, but also, a necessary intelligibility. Explanations must be demanded as to how they work, why they are implemented, how they are used, their results, etc. In other words, transparency alone is insufficient if ADSs and algorithms are not explained in an intelligible and accessible way.

According to the Office of the Privacy Commissioner of Canada (OPC), transparency should include "a right to explanation that would provide individuals interacting with AI systems the reasoning underlying any automated processing of their data, and the consequences of such reasoning for their rights and interests."[62] The principle of explainability therefore involves greater organizational accountability than the requirement of transparency alone. CEST also supports the principle of explainability.[63] This principle covers not only the **technical aspect** and **justification of the use** of an automated data processing system, but also, the **evaluation of results**. According to this principle, each step of an ADS, from its conception to the decisions rendered, should be intelligible and understood by the public.

As Mittelstadt and colleagues point out in their article "Explaining Explanations in AI," ADS explainability must involve processes that allow for the understanding, discussion, and challenge of models and decisions.[64] The intelligibility of technological systems is what will ensure that the ever-growing digitization of cities and public services complies with democratic principles and fundamental rights.

Introducing requirements on ADS explainability will likely allow for more debate on the right balance between, for example, technological performance and socially acceptable levels of surveillance. Without full understanding, weighing the desired relationship between more efficient and rapid management on the one hand, and the collective interest on the other, is practically impossible.

61. CAI, 2020b.
62. CPVPC, 2020.
63. CEST, 2020b.
64. Mittelstadt, Russel and Wachter, 2018.

CHAPTER 5

MONTRÉAL'S MUNICIPAL POWERS AND REGULATORY TOOLS: OVERVIEW OF WORK UNDERWAY

Canadian cities do not have full control over the oversight mechanisms that can be used to regulate technology and data use. Privacy is a shared provincial and federal responsibility, and telecommunications are a federal responsibility. Municipalities are required to comply with existing laws and charters—but this does not prevent them from taking action on data-driven technologies.

In this regard, depending on their jurisdiction and powers, cities have certain tools at their disposal, including the ability to regulate their own operations or negotiate supply contracts. Through these means, they can guide the development of technologies within their city limits and institute mechanisms for responsible governance. It is in fact at the municipal level that we are witnessing some of the most interesting innovations in terms of technological governance and regulations, as cities try to compensate for a lack of action by higher levels of government.

POWERS AND JURISDICTIONS

In Québec, several laws define the areas in which a city can exercise its jurisdiction. The *Municipal Powers Act* (MPA) gives cities "powers to meet diverse and changing municipal needs in the interests of their citizens."[65] The Act mainly to recognize that municipalities are local governments and to increase their autonomy and powers also gives municipal governments the authority to manage open data initiatives. As a metropolis, Montréal is also empowered to "establish the advisory bodies necessary to ensure the proper functioning and governance of the City."[66]

ECONOMIC AND POLITICAL LEVERS

Within the framework of its jurisdiction and powers, the City of Montréal has various means of taking action, including: 1) regulations; 2) procurement; 3) budget and capital projects; and 4) commitments and the adoption of principles, policies and general directives to guide its operating practices.

The City can use these tools to influence the data collection and usage practices of third parties with whom it works or who operate within its jurisdiction. However, not all these levers are fully exploited. It is important to mention that the rapidity of technological development explains in part the shortcomings currently observed in terms of oversight. Like many other cities, Montréal has begun to think about data governance and has made various commitments. However, to date, few concrete measures and mechanisms render these commitments truly effective. For example, we have yet to adopt clear guidelines on the procurement of technological goods and services from private suppliers.

INITIATIVES LAUNCHED BY THE CITY OF MONTRÉAL

Among the City's commitments are several declarations, including that of the Cities Coalition for Digital Rights[67] and the Montréal Declaration for the Responsible Development of Artificial Intelligence.
Two initiatives followed:

- The adoption of the *Digital Data Charter;*
- Upcoming discussions concerning proposals contained in the *Plan d'action des données ouvertes* (Action plan on open data).

65. Gouvernement du Québec, 2020c.
66. Gouvernement du Québec, n.d.
67. Cities for Digital Rights, n.d.

DIGITAL DATA CHARTER

Adopted in October 2020, the charter is a statement of principles that aims to guarantee human rights, ensure the primacy of the public interest and common good, and put data to work for the future. It is a crucial step for the further development of data-driven technologies.

While the *Digital Data Charter* does not specifically mention the principle of explainability, it does bring together several principles that can promote better understanding, encourage study and review, and allow for the rigorous evaluation of technologies, including ADSs.

The document focuses mainly on data and does not attempt to regulate algorithmic and decision support systems. The charter was presented as a document that would continue to evolve, and its adjustment and, above all, its implementation within the entire municipal administration and across municipal services will have to be monitored.

PROPOSED ACTION PLAN ON OPEN DATA

In 2019, the Laboratoire d'innovation urbaine de Montréal, an entity responsible for supporting city departments in their innovation process, began to consider an action plan for open data, of which one focus is data governance.[68] Several of the objectives and actions proposed in its discussion paper reflect a desire to institute mechanisms for responsible data management.

While the establishment of an open data action plan is a fundamental step for determining the goals and objectives that the city should be pursuing in the area of data governance, the proposed plan has several limitations, the main one being that, like the *Digital Data Charter*, it focuses only on open data. The action plan places little emphasis on audit, evaluation and accountability mechanisms. Both documents miss the opportunity to deploy a robust data and technology governance strategy.

BARRIERS AND ISSUES RELATED TO GOVERNANCE

Despite several undertakings and initiatives, we can identify various obstacles to the implementation of good data and technology governance.

The first obstacle is the speed at which technologies evolve. The rapid rate of change creates pressure on municipal governments to improve service delivery. At the same time, Montréal aspires to enhance its image as a smart city through technological innovation. These combined realities may encourage the municipal administration to prioritize the integration of technological solutions as a first step to solving a problem. Many technologies are not yet fully developed, so if technological solutions are to be introduced to address urban issues, it is important that they be tested and their use justified to the public.

Harmonizing practices across government and departments and establishing standards for responsible data management and data-driven technologies is also a major challenge for the City. The presence of numerous boroughs and administrative units complexifies the task of imposing standards, especially since responsible technology use requires that employees possess a certain degree of knowledge of these tools. Building in-house expertise is also a significant challenge, but one that must be addressed so that the City does not find itself in a position of dependence on private suppliers.

68. Ville de Montréal, n.d. b.

Another challenge for the City will be to put in place effective, transparent, clear and universally accessible mechanisms to assess the impacts of data-driven technologies. This will certainly require collaboration with a variety of independent experts.

The overview of technologies used by municipalities (Chapter 2) and the presentation of challenges and impacts (Chapter 3) reveal the complex factors that must be taken into account to fully assess the impacts of data-driven technologies. The City should consider the establishment of an independent, permanent committee to perform this function and facilitate ongoing communications and the exchange of information with the public.

CHAPTER 6

ACTIONS UNDERTAKEN AROUND THE WORLD

Over the past decade, cities have faced strong pressure to implement new technologies to optimize service delivery. They must deal with an increasingly digital society in a context where existing legislative frameworks are largely failing to keep pace with the issues of the digital age. As a result, cities have implemented various measures and initiatives to foster greater transparency with regard to data-driven technologies, improve public understanding of them, and make their uses beneficial to the public, accountable and inclusive.

CITY OF SEATTLE SURVEILLANCE ORDINANCE – UNITED STATES

In 2017, following concerns raised by citizens after the acquisition of potentially intrusive technologies without a prior impact study, the City of Seattle, U.S.A., passed an ordinance on surveillance technologies. The purpose of this measure was to provide greater transparency on the use of technology, but also to ensure that the City be more accountable in its acquisition of new technology. What is more, the ordinance was designed and oriented to ensure that the scope of evaluation include not only privacy issues, but also risks to civil liberties and impacts on individuals and communities. In addition, the evaluation process, which involves a committee representative of society, examines the reasons and objectives justifying the use of these technologies, while determining the framework and conditions of use.

NEW YORK CITY AUTOMATED DECISION SYSTEMS TASK FORCE (ADS TASK FORCE) – UNITED STATES

In 2018, New York City was the first jurisdiction to attempt to introduce a regulatory framework for the use of ADSs. In passing Local Law 49 of 2018 (LL49)[69], it aimed to combat algorithmic bias and discrimination resulting from ADSs, amid growing demands for public reviews of these technologies in response to a lack of transparency. LL49 led to the creation of a working group responsible for, among other things, drafting regulations to govern the use of ADSs[70]: the New York City Automated Decision Systems Task Force.

The task force's conclusions disappointed many observers as well as some of its members, who felt that the recommendations were far too broad.[71] Nevertheless, this is one of the first attempts at regulation and it can serve as a case study. Indeed, New York City's experience can serve as a reference for determining best practices and mistakes to avoid when setting up this type of task force. Finally, the passage of LL49 and the debates that its adoption has generated clearly demonstrate the need to shed light on and introduce regulatory frameworks for cities' use of ADSs.

OPEN ALGORITHM REGISTRIES: AMSTERDAM AND HELSINKI – THE NETHERLANDS AND FINLAND

In September 2020, the cities of Amsterdam[72] and Helsinki[73] announced the establishment of public registries on artificial intelligence and algorithms. The main purpose of these registries is to inform citizens about algorithms used by their city governments and to improve public comprehension of the algorithms. Maintaining a public registry is an important step, if for no other reason than to educate designers of ADSs about certain expectations that the public sector has for these systems (non-discrimination, knowledge of risks) if they are to be used to deliver public services.

69. The New York City Council, 2018.
70. Richardson, 2019.
71. Lecher, 2019, 20 November.
72. City of Amsterdam, n.d.
73. City of Helsinki, n.d.

TECHNOLOGY GOVERNANCE BASED ON DIGITAL SOVEREIGNTY: THE CASE OF BARCELONA - SPAIN

With regards to digital policy and technology, the City of Barcelona stands apart from other European cities, particularly for its smart city model. Indeed, Barcelona has long subscribed to the principle of digital sovereignty. Its municipal administration has embraced this principle to ensure that technologies and their uses are citizen-oriented, and, above all, that communities have control over them.[74] The City has created a number of positions and bodies and made them responsible for oversight of its use of data. By focusing on transparency and sovereignty of technologies and data, while implementing concrete structures to ensure responsible governance, Barcelona demonstrates its willingness to hold algorithmic systems accountable and to deploy the necessary measures to do so.

74. Bria, 2019.

CONCLUSION AND RECOMMENDATIONS

For over a decade, deployment of the smart city model has been transforming administrations, services and urban spaces generally. The discourse promoting technologies and the smart city model presents it as the answer to cities' contemporary challenges. In this context, cities have become prime locations for the development of a high-potential market and the implementation of new technological devices to assist, and, in some cases, automate decision-making.

The City of Montréal is no exception to this trend. Committed to the development of the smart city, it has repeatedly stated that it wants to adopt an approach in which technological tools would be at the service of citizens.[75]

Despite the City's commitments, there are significant transparency gaps that impede the democratic, accountable and inclusive development of data-driven technologies and automated decision support systems. The ongoing study by the Commission de la sécurité publique of the SPVM's use of ANPR technology is an example, as the technology has been in use since 2012 but had not been previously reviewed. Before the Commission de la sécurité publique had even completed its work, the City launched a smart parking pilot project (in Rosemont-La Petite-Patrie) involving the ANPR technology, without specifying a protocol for using the technology and the data.

It is currently difficult to determine which technologies are used by the City of Montréal and by all paramunicipal agencies. It is even more difficult to get a true picture of all the data captured and the uses to which it is put.

This is extremely problematic, given that the laws protecting personal information in Québec are currently obsolete. In addition to outdated legal frameworks, numerous studies show that data-driven technologies that aid in decision-making are likely to (re-)produce racial bias and lead to discriminatory practices.[76] The City of Montréal recently acknowledged the problem of systemic racism within the municipal administration and the SPVM. In order to start to tackle this problem, the integration of data-driven technologies must be properly regulated and done in a transparent manner.

Since data-driven technologies and ADSs are not neutral, understanding and assessing their impacts on human rights is essential to ensuring their fairness and inclusiveness. The purpose of a measure such as the ADS impact assessment is to identify ADS blind spots and discriminatory biases that could cause harm to individuals, groups, or communities. Algorithmic injustice exists, and it is now clear that technologies, because of their alleged neutrality, can contribute to reproducing and reinforcing the biases inherent in data, and thus participate in reproducing existing inequalities.

Cities' digital trajectories foster the deployment of connected urban infrastructure, the ever-increasing production of data and a multiplication of tools to process it. Furthermore, technological innovation is accompanied by a tenfold increase in individual identification and traceability capabilities, hence, surveillance capabilities.

75. Ville de Montréal, 2019.
76. Radio-Canada, 2020, 27 November.

There is therefore an urgent need to find, develop and implement mechanisms that will ensure dialogue between technological systems and society. In other words, the use of ADSs and data must be explained, evaluated, and justified to ensure the community trusts these technologies and that they are deployed in a responsible manner.

Under these conditions, the digital trajectory adopted by the City of Montréal and its public and quasi-public agencies must be guided not only by principles, but also by clearly stated public policies and regulations. **Cities are key drivers of technological development, and the City of Montréal has already announced that it wants to play a leading role in the responsible integration and use of these technologies.** The *Digital Data Charter* is an example of this commitment. However, more thought and work is needed to ensure that these commitments are translated into appropriate regulations, practices and governance mechanisms.

OUR RECOMMENDATIONS

It is the CjM's position that ensuring automated decision systems are used in a responsible, transparent, inclusive, intelligible and democratic manner should be the priority during their implementation, and not the optimization of infrastructure and service management.

To guide the development of responsible data governance and automated decision systems, the CjM makes the following recommendations:

1. That the City of Montréal adopt a cross-cutting action plan for regulating its use of data and data-driven technologies in order to ensure that they are used in a responsible, fair and equitable manner; and that it ensure compliance with this framework in all city departments and boroughs.

2. That the City of Montréal create:

    - A public registry of its digital datasets that includes all data that is captured in municipal public spaces, the entities that capture the data, how the data is processed and stored, how consent was obtained, the decision-making purposes associated with the data collected, the entities that have access to the data, and the terms and conditions related to data sharing;
    - A public registry of automated decision systems indicating all automated decision systems as well as, for each system, its purpose, how it works, conditions of use, risks, the impact assessment report that was conducted for the system, and information on the author of the system.

    Both registers must be public, intelligible and easily accessible online. When the nature and details of a dataset or an ADS cannot be made public, this decision must be clearly justified and the reason for non-disclosure made explicit. In all cases, the very existence of the datasets and ADSs affected by such withholding of information must be mentioned in the relevant public register.

3. Considering the position adopted by the City of Montréal to prohibit the collection of biometric data "without consent, by entities under the responsibility of City Council, and to apply the principles of inclusive public participation"[77]:
   - That the City of Montréal adopt a moratorium on the use of surveillance technologies based on biometric data, pending the adoption of a law or regulation governing their use;
   - That the City of Montréal suspend its funding and support for any experimental projects currently underway or new projects under development involving biometric recognition technologies.
4. That the City of Montréal adopt a moratorium on the use or acquisition of predictive policing technologies, to be in effect until policies and legal and regulatory frameworks, including public consultation mechanisms, are fully deployed to ensure that human rights are respected.
5. That the City of Montréal review its regulations to ensure that they respect the principles set out in the *Digital Data Charter* and that it give the Charter precedence in the analysis of draft regulations.
6. That the City of Montréal appoint a person responsible for data protection and impact assessment of the data-driven and decision support technologies used by municipal departments and agencies.
7. That the City of Montréal create an independent, permanent, diverse body involving civil society and give it the responsibility of assessing the impacts of data-driven and decision support technologies used by municipal organizations.

The City of Montréal will need to provide recurring funding to this body so that it can carry out its mission. The composition of this body should be determined by a public consultation. The CjM believes that this committee must be representative of the Montréal population and based on multidisciplinary expertise.

8. That the City of Montréal put in place clear measures to inform a person when he or she is affected by a decision made by an ADS, and that it develop an independent process for handling complaints arising from decisions made by an ADS, while guaranteeing the right to appeal.
9. That the City of Montréal set up an independent public consultation on ADSs and task the officials who will spearhead this consultation with:
   - Providing a full accounting of how the City uses ADS;
   - Proposing criteria and rules for assessing the impact and risk level of ADSs and requirements by impact level;
   - Proposing procedures to ensure that the life cycle of collected public data complies with the principles of the *Digital Data Charter*.

77. Ville de Montréal, 2020.

10. That the City of Montréal develop public participation mechanisms to:

- Continuously inform citizens about the use of ADSs, the use of digital data and their impacts;
- Engage the public on technology assessment and development issues; and
- Develop data governance that is collaborative, effective, accountable and responsible.

11. That the City of Montréal coordinate and centralize, through the adoption of official policy, all acquisitions related to data-driven technology within its Service des technologies de l'information (STI).

12. That the City of Montréal adapt the *Règlement du conseil de la ville* sur la gestion contractuelle to comply with the principles of the *Digital Data Charter*, and require its third-party suppliers to produce a risk analysis of their technologies and provide the database used to test their product or service prior to its acquisition by the City.

13. That the City of Montréal develop processes to detect and assess the risks of so-called "shadow IT," as well as implement awareness and training strategies for employees.

14. That the City of Montréal protect collected personal data and include clauses in all contracts with its suppliers requiring:

- That collected personal data remains the sole property of the City; and
- That this data be hosted in Canada.

15. That the City of Montréal favour, in its selection of its external partners and suppliers, those that do not impose trade secret constraints or other barriers that would impede the evaluation of ADSs provided to the City.

BIBLIOGRAPHY

AFP (2020, 10 April). "Des drones traquent et prennent la temperature," *TVA Nouvelles*, (https://www.tvanouvelles.ca/2020/04/10/des-drones-traquent-et-prennent-la-temperature).

Agence de mobilité durable de Montréal. *Projet pilote – lecture de plaque* (LAPI). Retrieved from https://www.agencemobilitedurable.ca/fr/projets/projet-pilote-lecture-de-plaques-lapi.html.

AI Now Institute (n.d.). "Automated decision systems. Examples of Government Use Cases." Retrieved from https://ainowinstitute.org/nycadschart.pdf.

AI Now Institute (2019). "A Shadow Report of the New York City Automated Decision System Task Force." Retrieved from https://ainowinstitute.org/ads-shadowreport-2019.pdf.

Bakke, E. (2018). "Predictive Policing the Argument for Public Transparency." *NYU Annual Survey of American Law,* 74: 131–172. Retrieved from https://annualsurveyofamericanlaw.org/wp-content/uploads/2019/08/74-1-Predictive-Policing-The-Argument-for-Public-Transparency.pdf.

Benbouzid, B., and D. Cardon (2018). "Machines à prédire." *Réseaux*, La Découverte, No. 211: 9–33. Retrieved from https://www.cairn.info/revue-reseaux-2018-5-page-9.htm.

Brauneis R., and E. P. Goodman (2018). "Algorithmic Transparency for the Smart City." *Yale Journal of Law & Tech*, 20(103). GWU Law School Public Law Research Paper, GWU Legal Studies Research Paper, p. 103-177. Retrieved from https://ssrn.com/abstract=3012499.

Breux, S., and J. Diaz (2017). "La ville intelligente. Origine, définitions, forces et limites d'une expression polysémique." INRS, Montréal. Retrieved from http://espace.inrs.ca/id/eprint/4917/1/Rapport-LaVilleIntelligente.pdf.

Bria, F. (2019). "The right to the (digital) city." *Barcelona Metropolis*. Retrieved from https://www.barcelona.cat/metropolis/en/contents/right-digital-city.

CAI (2020a). *Biométrie : principes à respecter et obligations légales des organisations. Guide d'accompagnement pour les organismes publics et les entreprises.* Retrieved from https://www.cai.gouv.qc.ca/documents/CAI_G_biometrie_principes-application.pdf.

CAI (2020b). "Projet de loi no 64, Loi modernisant des dispositions législatives en matière de protection des renseignements personnels." CAI brief presented to the Commission des institutions dans le cadre des consultations particulières et auditions publiques. Retrieved from https://www.cai.gouv.qc.ca/documents/CAI_M_projet_loi_64_modernisation_PRP.pdf.

Calo, R., and D. K. Citron (2020). "The Automated Administrative State: A Crisis of Legitimacy." *Boston University School of Law.* Retrieved from https://scholarship.law.bu.edu/faculty_scholarship/838.

Cardon, D. (2018). "Le pouvoir des algorithms." *Pouvoirs*, 1(164): 63–73. Retrieved from https://doi.org/10.3917/pouv.164.0063.

Castets-Renard, C., P. Besse, J.-M. Loubes, L. Perrussel (2019). "Encadrement des risques techniques et juridiques des activités de police predictive." *Rapport final*, Ministère de l'Intérieur, France. Retrieved from https://hal.archives-ouvertes.fr/hal-02190585/document.

Castets-Renard, C. (2020). *Rapport sur le cadre juridique applicable à l'utilisation de la reconnaissance faciale*, OBVIA. Retrieved from https://www.docdroid.com/YIDTjrr/cadre-juridique-applicable-a-lutilisation-de-la-reconnaissance-faciale-par-les-forces-de-police-dans-lespace-public-au-quebec-et-au-canada-pdf.

CBC News (2014, 3 November). "Facial recognition software to aid Calgary police in future investigations." Retrieved from https://www.cbc.ca/news/canada/calgary/facial-recognition-software-to-aid-calgary-police-in-future-investigations-1.2822592.

CEST (2020a). *Les enjeux éthiques soulevés par la reconnaissance faciale,* 8e commission jeunesse. Retrieved from https://www.ethique.gouv.qc.ca/media/1367/cest-j_2020_reconnaissance_faciale_acc_web.pdf.

CEST (2020b). "Réponse au document de consultation sur l'intelligence artificielle de la Commission d'accès à l'information du Québec."Brief. Retrieved from https://www.ethique.gouv.qc.ca/media/1338/cest_ia_cai_2020.pdf.

Champagne, S. (2019, 20 August). "Montréal étudiera l'utilisation des technologies de reconnaissance faciale par le SPVM." *La Presse*. Retrieved from https://www.lapresse.ca/actualites/grand-montreal/2019-08-20/montreal-etudiera-l-utilisation-des-technologies-de-reconnaissance-faciale-par-le-spvm.

Charron, M., R. Shearmur and G. Beauchemin (2017). "Les données massives peuvent-elles éclairer le développement territorial?" Research report. Retrieved from https://www.researchgate.net/profile/Mathieu_Charron/publication/316754249_Donnees_massives_et_developpement_territorial/links/5910cacaa6fdccbfd58fb85c/Donnees-massives-et-developpement-territorial.pdf.

Cities for Digital Rights (n.d.). *Declaration of Cities Coalition for Digital Rights*. Retrieved from https://citiesfordigitalrights.org/declaration.

Citizen Lab (Munk School of Global Affairs & Public Policy, University of Toronto) and International Human Rights Program (Faculty of Law, University of Toronto) (2020). *To Surveil and Predict: A Human Rights Analysis of Algorithmic Policing in Canada.* Analysis by Kate Robertson, Cynthia Khoo and Yolanda Song. Retrieved from https://citizenlab.ca/wp-content/uploads/2020/09/To-Surveil-and-Predict.pdf.

City of Amsterdam (n.d.). *Algorithm Register Beta.* Retrieved from https://algoritmeregister.amsterdam.nl/en/ai-register/.

City of Helsinki (n.d.). *AI Register.* Retrieved from https://ai.hel.fi/en/ai-register/.

CPVPC, CAI, CIPVP de la C.-B. and CIPVP de l'Alb. (2021). *Rapport de conclusions. Enquête conjointe sur Clearview AI, Inc.* Retrieved from https://decisions.cai.gouv.qc.ca/cai/ss/fr/item/492282/index.do.

Déclaration de Montréal IA responsable (2018). *La déclaration de Montréal pour un développement responsable de l'intelligence artificielle.* Retrieved from https://5da05b0d-f158-4af2-8b9f-892984c33739.filesusr.com/ugd/ebc3a3_20142aa15c95497ba8a3df2bde4fc04f.pdf.

Eubanks, V. (2018). "High-Tech Homelessness." *American Scientist,* 106(4). Retrieved from https://www.americanscientist.org/article/high-tech-homelessness.

Ferguson, A. G. (2017). "Policing Predictive Policing." *Washington University Law Review,* 94 (5): 1115–1194. Retrieved from https://ssrn.com/abstract=2765525.

Ferguson, A. G. (2019). "Predictive Policing Theory." In Rice Lave, T., and Miller, E. J. (eds.), *The Cambridge Handbook of Policing in the United States.* Cambridge University Press, American University, WCL Research Paper No. 2020-10: 491–510. Retrieved from https://ssrn.com/abstract=3516382.

Fussey, P., and D. Murray (2019). "Independant Report on the London Metropolitan Police Service's Trial of Life Facial Recognition Technology." *The Human Rights, Big Data and Technology Project.* Retrieved from https://www.hrbdt.ac.uk/download/independent-report-on-the-london-metropolitan-police-services-trial-of-live-facial-recognition-technology/.

Gautron, V. (2019). "Surveiller, sanctionner et prédire les risques : les secrets impénétrables du fichage policier." *Champ pénal/Penal Field.* Retrieved from https://journals.openedition.org/champpenal/10843?lang=en#tocto2n3.

Gómez, A. A. (2020). "La non-neutralité de la technologie. Une ontologie sociohistorique du phénomène technique." *Écologie & politique* 61(2): 27–43. Retrieved from https://doi-org.proxy.bibliotheques.uqam.ca/10.3917/ecopo1.061.0027.

Gorner, J. (2020, 24 January). "For years Chicago police rated the risk of tens of thousands being caught up violence. That controversial effort has quietly been ended." *Chicago Tribune.* Retrieved from https://www.chicagotribune.com/news/criminal-justice/ct-chicago-police-strategic-subject-list-ended-20200125-spn4kjmrxrh4tmktdjckhtox4i-story.html.

Gouvernement du Québec (n.d.). *Montréal. Notre métropole,* document explicatif. Retrieved from http://ville.montreal.qc.ca/pls/portal/docs/PAGE/PRT_VDM_FR/MEDIA/DOCUMENTS/DOCUMENT_SYNTHESE_MONTREAL_METROPOLE.PDF.

Gouvernement du Québec (2020a). *Projet de loi nº 64. Loi modernisant des dispositions législatives en matière de protection des renseignements personnels*. Retrieved from http://m.assnat.qc.ca/fr/travaux-parlementaires/projets-loi/projet-loi-64-42-1.html. (Available in English: *Act to modernize legislative provisions as regards the protection of personal information.* http://m.assnat.qc.ca/en/travaux-parlementaires/projets-loi/projet-loi-64-42-1.html.

Gouvernement du Québec (2020b – Updated 20 October). *Loi sur l'accès aux documents des organismes publics et sur la protection des renseignements personnels.* Retrieved from http://legisquebec.gouv.qc.ca/fr/pdf/cs/A-2.1.pdf. (Available in English: *Act respecting Access to documents held by public bodies and the Protection of personal information.* http://legisquebec.gouv.qc.ca/en/showdoc/cs/A-2.1.

Gouvernement du Québec (2020c, updated 10 December). *Loi sur les compétences municipales.* Retrieved from http://legisquebec.gouv.qc.ca/fr/showDoc/cs/C-47.1?&digest. (Available in English: *Municipal Powers Act.* http://legisquebec.gouv.qc.ca/en/ShowDoc/cs/C-47.1.

Grother, P., M. Ngan and K. Hanaoka (2019). "Face Recognition Vendor Test (FRVT) Part 3: Demographic Effects, National Institute of Standards and Technology." *NISTIR 8280*, December. Retrieved from https://doi.org/10.6028/NIST.IR.8280.

Guillaud, H. (2019, 14 November). "De l'explicabilité des systèmes : les enjeux de l'explication des décisions automatisées." *Internetactu.net.* Retrieved from http://www.internetactu.net/2019/11/14/de-lexplicabilite-des-systemes-les-enjeux-de-lexplication-des-decisions-automatisees/.

Guillaud, H. (2019, 13 December). "De la difficulté à imposer la transparence des décisions automatisées." *Internetactu.net.* Retrieved from http://www.internetactu.net/a-lire-ailleurs/de-la-difficulte-a-imposer-la-transparence-des-decisions-automatisees/.

Halin, F. (2018, 29 September). "Abribus intelligent et navette autonome pour le Laboratoire à ciel ouvert de la vie." *Journal de Montréal.* Retrieved from https://www.journaldemontreal.com/2018/09/26/abribus-intelligent-et-navette-autonome-pour-le-laboratoire-a-ciel-ouvert-de-la-vie-intelligente.

Hill, C. (2016, 20 October). "The Color of Surveillance in San Diego." *ACLU of San Diego & Imperial Counties.* Retrieved from https://medium.com/@SDACLU/the-color-of-surveillance-in-san-diego-4dce43abe67c.

Institut d'aménagement et d'urbanisme (2019, April). *La police prédictive. Enjeux soulevés par l'usages des algorithmes prédictifs en matière de sécurité publique.* Retrieved from https://www.iau-idf.fr/fileadmin/NewEtudes/Etude_1797/Etude_Police_Predictive_V5.pdf.

Kitchin, R. (2015). "Making sense of smart cities: addressing present shortcomings." *Cambridge Journal of Regions, Economy and Society,* 8 (1): 131–136. Retrieved from https://doi.org/10.1093/cjres/rsu027.

Kitchin, R. (2016). "Reframing, reimagining and remaking smart cities." *The Programmable City Paper 20, working paper*. Retrieved from http://mural.maynoothuniversity.ie/7354/.

Laurent, A. (2020, 29 April). "Covid-19 : à Cannes, des caméras repèrent automatiquement le port du masque." *Usbek & Rica.* Retrieved from https://usbeketrica.com/fr/article/covid-19-a-cannes-des-cameras-reperent-automatiquement-le-port-du-masque

Lecher, C. (2019, 20 November). "NYC's algorithm task force was 'a waste', member says." *The Verge.* Retrieved from https://www.theverge.com/2019/11/20/20974379/nyc-algorithm-task-force-report-de-blasio.

Leloup, D. (2018, 9 October). "À Los Angeles, l'ombre de Palantir sur un logiciel décrié de police predictive." *Le Monde.* Retrieved from https://www.lemonde.fr/pixels/article/2018/10/09/a-los-angeles-l-ombre-de-palantir-sur-un-logiciel-decrie-de-police-predictive_5366955_4408996.html.

Lippert, R. K. (2008). "David Lyon, Surveillance Studies: An Overview." *Canadian Journal of Sociology / Cahiers canadiens de sociologie,* 33 (2): 471–474. Retrieved from https://doi.org/10.29173/cjs2004.

Lynch, J. (2020). *Face Off. Law enforcement use of face recognition technology,* Electronic Frontier Foundation. Retrieved from https://www.eff.org/files/2020/04/20/face-off-report-2020_1.pdf.

Manthorpe, R., and A. J. Martin (2019, 4 July). "81% of 'suspects' flagged by Met's police facial recognition technology innocent, independent report says." *Sky News.* Retrieved from https://news.sky.com/story/met-polices-facial-recognition-tech-has-81-error-rate-independent-report-says-11755941.

Mittelstadt, B., C. Russel and S. Wachter (2018). "Explaining Explanation in AI." *FAT*19: Proceedings of the Conference on Fairness, Accountability, and Transparency.* Retrieved from https://doi.org/10.1145/3287560.3287574.

Normandin, P.-A. (2019, 19 March). "Services : Montréal misera sur l'intelligence artificielle." *La Presse.* Retrieved from https://www.lapresse.ca/actualites/grand-montreal/201903/18/01-5218722-services-montreal-misera-sur-lintelligence-artificielle.php.

Normandin, P.-A. (2019, 15 October). "Des caméras seront installées pour évaluer les foules." Retrieved from https://plus.lapresse.ca/screens/760b3517-c607-479a-866c-1e9b08eb717d__7C___0.html.

Observatoire international sur les impacts sociétaux de l'IA et du numérique (2020, April). *Repenser la protection des renseignements personnels à la lumière des défis soulevés par l'IA. Document de réponse aux questions posées par la Commission d'accès à l'information du Québec dans le cadre de la consultation sur l'intelligence artificielle.* Retrieved from http://collections.banq.qc.ca/ark:/52327/bs4067010.

Privacy Commissioner of Canada (2019). "Réforme des lois sur la vie privée. Pour faire respecter les droits et rétablir la confiance envers le gouvernement et l'économie numériques," *Rapport annuel 2018-2019.* Retrieved from https://www.priv.gc.ca/media/5077/ar_201819_fra.pdf. (Also available in English: "Privacy Law Reform – A Pathway to Respecting Rights and Restoring Trust in Government and the Digital Economy. 2018-2019 Annual Report to Parliament on the Privacy Act and the Personal Information Protection and Electronic Documents Act. https://www.priv.gc.ca/en/opc-actions-and-decisions/ar_index/201819/ar_201819/.

Privacy Commissioner of Canada (2020, 13 March). "Consultation sur les propositions du Commissariat visant à assurer une réglementation adéquate de l'intelligence artificielle." Retrieved from https://www.priv.gc.ca/fr/a-propos-du-commissariat/ce-que-nous-faisons/consultations/consultations-terminees/consultation-ai/pos_ai_202001/. (Also available in English: "Consultation on the OPC's Proposals for ensuring appropriate regulation of artificial intelligence." https://www.priv.gc.ca/en/about-the-opc/what-we-do/consultations/completed-consultations/consultation-ai/pos_ai_202001/.

Radio-Canada (2020, 27 November). "L'ONU sonne l'alarme sur les biais raciaux de certains algorithms." Retrieved from https://ici.radio-canada.ca/nouvelle/1752869/onu-comite-profilage-racial-reconnaissance-faciale-algorithme.

Richardson, R. (ed.) (2019). *Confronting Black Boxes: A Shadow Report of the New York City Automated Decision Systems Task Force,* AI Now Institute. Retrieved from https://ainowinstitute.org/ads-shadowreport-2019.pdf.

Richardson, R., J. M. Schultz and K. Crawford (2019). "Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice." *New York University Law Review*, *94* (192): 192-233. Retrieved from https://ssrn.com/abstract=3333423.

Rocher, L., J.-M. Hendrickx and Y.-A. de Montjoye (2019). "Estimating the success of re-identifications in incomplete datasets using generative models." *Nature Communication*, No. 10, Article nº 3069: 1–9. Retrieved from https://doi.org/10.1038/s41467-019-10933-3.

Scassa, T. (2015). "Emerging Legal Issues in the Smart Cities Context." *Centre for Law, Technology and Society*. Retrieved from https://techlaw.uottawa.ca/news/emerging-legal-issues-smart-cities-context.

Singer, N., et C. Metz (2019, 19 December). "Many Facial-Recognition Systems Are Biased, Says U.S. Study." *The New York Times.* Retrieved from https://www.nytimes.com/2019/12/19/technology/facial-recognition-bias.html.

The City of Calgary Newsroom (2014, 3 November). "Facial Recognition To Aid Investigations." Retrieved from https://newsroom.calgary.ca/facial-recognition-to-aid-investigations/.

The New York City Council (2018). *A Local Law in relation to automated decision systems used by agencies.* Retrieved from https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3137815&GUID=437A6A6D-62E1-47E2-9C42-461253F9C6D0.

Townsend, A. (2013). *Smart Cities: Big Data, Civic, Hackers, and the Quest for a New Utopia.* New York: W.W. Norton & Company.

Treasury Board of Canada (2019). *Directive sur les décisions automatisées,* Gouvernement du Canada. Retrieved from https://www.tbs-sct.gc.ca/pol/doc-fra.aspx?id=32592. (Also available in English: *Directive on Automated Decision-Making* at https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592).

Trujilo, E. (2019, 23 September). "En Chine, un système de reconnaissance faciale a été installé à l'entrée du metro." *BFM Business.* Retrieved from https://www.bfmtv.com/tech/vie-numerique/en-chine-un-systeme-de-reconnaissance-faciale-a-ete-installe-a-l-entree-du-metro_AN-201909230066.html.

Van Dijck, J. (2013). *Culture of Connectivity: A critical history of social media,* Oxford.

Van Dijck, J. (2014). "Datafication, dataism and dataveillance." *Surveillance & Society, 12* (2): 197–208. Retrieved from https://doi.org/10.24908/ss.v12i2.4776.

Ville de Montréal (n.d. a). *Stratégie montréalaise 2014-2017*. Retrieved from https://laburbain.montreal.ca/sites/villeintelligente.montreal.ca/files/strategie-montrealaise-2014-2017-ville-intelligente-et-numerique-fr-amendee.pdf.

Ville de Montréal (n.d. b). *Plan d'action données ouvertes 2019,* consultative document. Retrieved from https://docs.google.com/document/d/1xnZ0liZfQ-4aszP3gWy4z0pCjnK8XBsICndnAv_RwtM/edit#heading=h.44sinio.

Ville de Montréal (2019). *Défi des villes intelligentes du Canada. Candidature finale de la Ville de Montréal.* Retrieved from https://laburbain.montreal.ca/sites/default/files/candidature_fr_defi_des_villes_intelligentes_vf.pdf. (Available in English: *Canada's Smart Cities Challenge. Final application by the City of Montréal.* Retrieved from https://futurecitiescanada.ca/downloads/portal/1._Montreal_FP_%28English_translation%29_.pdf.

Ville de Montréal (2020, October). *Charte des données numériques.* Retrieved from https://laburbain.montreal.ca/sites/default/files/charte_donnees_numeriques_1_0.pdf. (Available in English: *Montréal's Digital Data Charter.* Retrieved from: https://laburbain.montreal.ca/sites/villeintelligente.montreal.ca/files/25817-charte_donnees_numeriques_ang.pdf.

PHOTO CREDITS

1st and 4th cover : Marie-France l'Écuyer . MEM - Centre des Mémoires montréalaises

Chapter 1 : Rodrigolab . Dreamstime.com

Chapter 2 : Marc Bruxelle . Dreamstime.com

Chapter 3 : Mario Beauregard . Dreamstime.com

Chapter 4 : Patrick Pilon . MEM - Centre des Mémoires montréalaises

Chapter 5 : Firefighter Montreal . Adobe Stock

Chapter 6 : Audrey-Frédérique Lavoie

Conclusion and recommendations : Pierre D'Amours . MEM - Centre des Mémoires montréalaises

GRAPHIC TREATMENT OF PHOTOGRAPHS

Diane Morin

CONSEIL JEUNESSE DE MONTRÉAL

Montréal