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100

RESILIENT

CITIES



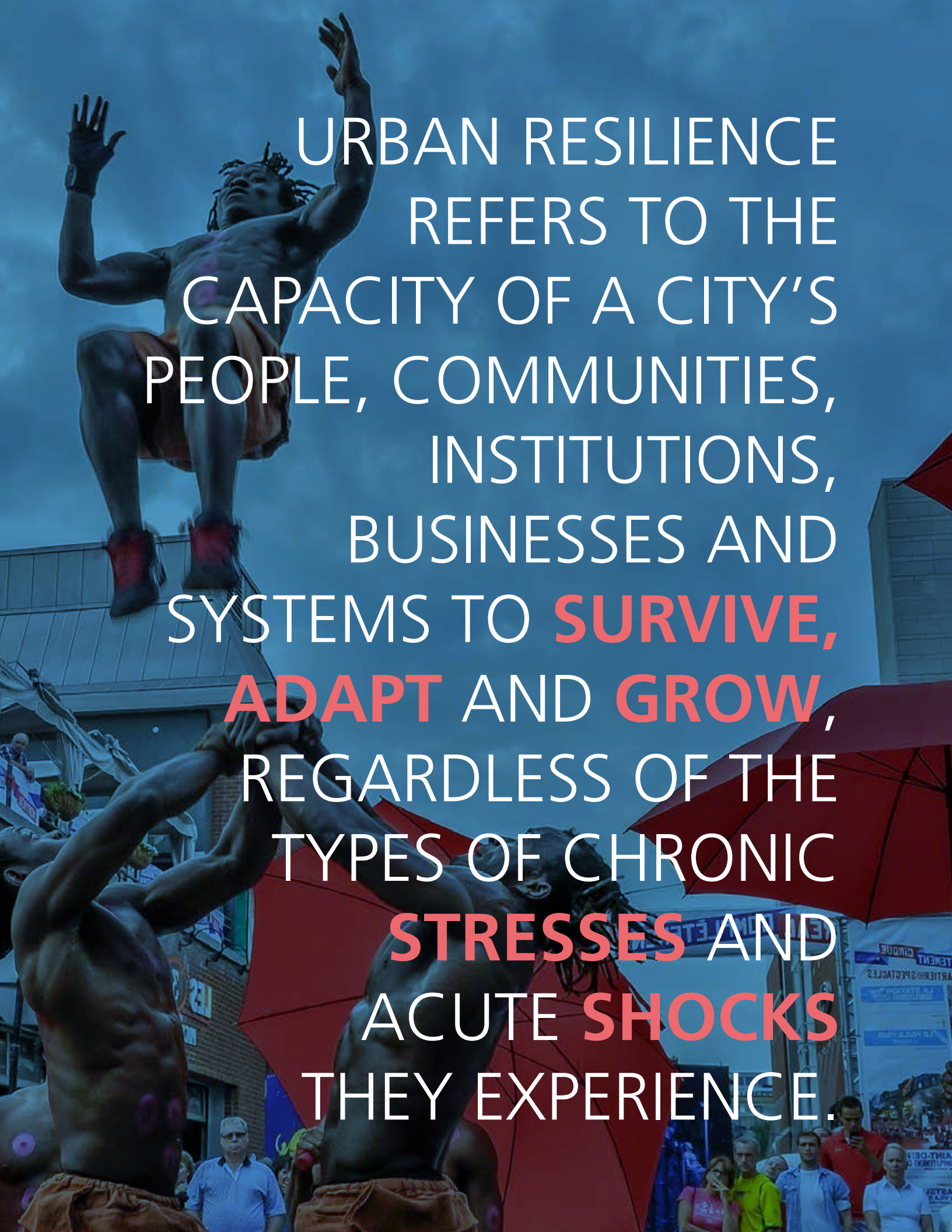
Montréal's Resilient City Strategy

Montréal 





Montréal's Resilient City Strategy



URBAN RESILIENCE
REFERS TO THE
CAPACITY OF A CITY'S
PEOPLE, COMMUNITIES,
INSTITUTIONS,
BUSINESSES AND
SYSTEMS TO **SURVIVE,**
ADAPT AND **GROW,**
REGARDLESS OF THE
TYPES OF CHRONIC
STRESSES AND
ACUTE **SHOCKS**
THEY EXPERIENCE.

REFLECTIVE
RESOURCEFUL
ROBUST
REDUNDANT
FLEXIBLE
INCLUSIVE
INTEGRATED



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In this document, the masculine gender indicates both sexes, with no discrimination intended.



MESSAGE FROM THE MAYOR

Montréal became the first Canadian city to join the **100 Resilient Cities** program in December 2014, chosen by the New York-based Rockefeller Foundation, a major philanthropic organization. Our metropolis thus aligned itself with the cities of Sydney, London, Paris, Singapore and Barcelona. Toronto, Calgary and Vancouver quickly followed suit and helped to form a working group on best practices in resilience.

This prestigious international network has a mission to improve the resilience of cities, which today face growing environmental, social and economic challenges.

To build on this momentum, Montréal created its Bureau de la résilience in May 2016. The Bureau's chief objective is to develop the Urban Resilience Strategy announced today.

Montréal's Resilient City Strategy is geared to all Montrealers. It will allow our city to better adapt to the challenges and contingencies it is called upon to deal with while continuing to develop. At the same time, the Strategy will allow the population, institutions, companies and essential systems to better react and stand up to contingencies.

With this Strategy, the municipal administration hopes to improve its capacity to anticipate, prevent and adapt to the problems and risks that could impact Montrealers. We're adopting the tools to improve our response to events, such as a natural catastrophe, a tragedy or an attack, and to situations likely to render the city vulnerable, such as the aging of the population, social exclusion, poverty, and deteriorating infrastructures.

As a member of the 100 Resilient Cities program, Montréal intends to foster a discussion with other world cities concerning the urban challenges posed by living-together and the fight against social exclusion and isolation.

This Strategy calls for an initial five-year action plan intended to improve the capacity of the city and all its partners to deal effectively with disturbances.

Our municipal administration will take action to establish a unified and safe community, protect our living environment, maintain a diversified and innovative economy, and promote integrated governance in the service of the community.



Valérie Plante
Mayor
Ville de Montréal



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MESSAGE FROM THE CHIEF RESILIENCE OFFICER

In the last two years, the team at the Bureau de la résilience has consulted citizens, city employees, researchers, emergency measures managers, and representatives of community-based organizations and business leaders in an effort to develop a proactive approach to meeting challenges across its territory. This vital collaboration marked the start of a progressive process meant to allow Montréal and Montrealers to strengthen their resilience capacity.

In order to adapt to the challenges of the 21st century, we must collectively improve our understanding and anticipation of climate issues as well as social, technological and economic issues. It's important, as well, that we learn to better prepare for disturbances, regardless of their nature.

Across the world, catastrophes are increasingly intense and complex. In 2017, Montréal bore the full brunt of severe weather events. Montrealers, in particular, demonstrated their solidarity during the spring floods that struck the north-west of the island, and certain vulnerabilities remain. This year marks the 20th anniversary of the Ice Storm, and our city must continue to improve its adaptation and prevention capacity in the face of disruptive events, supported by a comprehensive vision of civil security issues.

With this Strategy, the municipal administration is seizing the opportunity presented by the 100 Resilient Cities initiative to promote the further development of resilience capacity among Montrealers, within the city, and in organizations and companies that play a key part in the city's development.

Montréal's Resilient City Strategy is not an end in itself – quite the contrary! All citizens are invited to take part in this urban resilience process, which we hope will lead us, collectively, towards a safer, more equitable and sustainable society.

Louise Bradette
Chief Resilience Officer
Ville de Montréal



MESSAGE FROM THE PRESIDENT OF 100 RESILIENT CITIES

On behalf of 100 Resilient Cities – Pioneered by The Rockefeller Foundation (100RC), I want to congratulate Mayor Valerie Plante, Chief Resilience Officer Louise Bradette, and the City of Montréal on the release of the city’s and Canada’s first Resilience Strategy.

When we chose Montréal to join the 100RC Network, we saw a city poised to address its vulnerability to chronic stresses and acute shocks through more integrated, sustainable planning, while fostering a city more resilient to the known and unknown challenges of the 21st Century. Since then, we have seen a city primed to serve as a model of resilience for other cities in Canada and around the world.

Montréal’s resilience was both tested and on full display in May 2017, when the city and surrounding communities experienced historic, powerful flooding that displaced thousands. The flood underpinned the importance of Montréal’s focus on urban resilience. Montréal had not been tested like this in nearly 20 years and with resilience in mind the city is now using the lessons from this to shape future actions and investments, for this and other potential threats.

The priorities contained in this Strategy reflect the city it serves. By emphasizing community resilience, Montréal will build citizen preparedness and social cohesion, leveraging the city’s rich history of diversity. By focusing on risk awareness and prevention, the city will leverage the work of partners like Wood and the 2017 flood to better enable the city to thrive in good times and bad. And through a focus on critical infrastructure, Montréal will better understand the opportunities for instituting multiple benefits into infrastructure investments to ensure efficient, resilient infrastructure that serves all of the city’s residents.

Importantly, this Strategy exhibits how resilience thinking enables a city to break down siloes and integrate priorities across city government. We have and will continue to be a proud partner in the city’s efforts to build a more resilient city. Along with fellow 100RC Network members Calgary, Toronto, and Vancouver, we are excited to see the practice of urban resilience take root in Canada with this first step.

Michael Berkowitz
President of 100 Resilient Cities –
Pioneered by
The Rockefeller Foundation



WHY AN URBAN RESILIENCE STRATEGY?

1.1 RELEVANCE

Because the city, as an organization, plays a preponderant role at the local level, it is crucial that it meet the needs and expectations of its citizens and be the first to take action in emergency situations. The city, today, wishes to improve its capacity to anticipate, prevent and adapt to problems and risks likely to affect Montrealers as well as Montréal's assets and development. The municipal administration also intends to heighten awareness among citizens and business managers across the city of the importance of developing their state of preparedness in order to better deal collectively with shocks (earthquakes, floods, critical infrastructure breakdowns, etc.) and stresses (climate change, poverty/social inequality, aging infrastructures, etc.).

Resilience has been identified, in recent years, as a quality that's essential to promoting the capacity of cities to deal with events and threats. While the city already has programs that, directly and indirectly, help make Montréal more resilient, there was a clear need to adopt a formal resilience strategy. This strategy will lend it a more comprehensive vision of current vulnerabilities, with an improved capacity to anticipate future vulnerabilities, and an integrated and efficient action plan geared to the specific challenges we face.

1.2 SCOPE

Montréal's Resilient City Strategy constitutes an ambitious initial proposal for Montréal. Using the citizen as its starting point and then shifting its focus to the Montréal community, the municipal administration, and ultimately to public and private organizations, this strategy broadly reflects a global movement towards resilience. This movement recognizes the necessity of pooling our efforts across all spheres of society in order to make cities more resilient. Montréal's Resilient City Strategy is thus geared to **all Montrealers**. An initial five-year action plan sets out four major orientations and 12 objectives.

1.3 BUILDING ON WHAT EXISTS

Montréal is a dynamic and innovative city where the municipal administration, urban development actors, community stakeholders and business people are invested and involved in planning. As a result of these efforts, numerous initiatives – plans, programs, strategies and policies – have been put in place and are exerting a positive impact on the city’s resilience. These actions were compiled and analyzed during Phase 1 of the development of the strategy. A synthesis was presented in the Preliminary Resilience Assessment issued in February 2017.

The municipal administration has put forward new actions since the publication of the Preliminary Resilience Assessment. The city’s first Social Development Policy, called *Montréal de tous les possibles*, is intended to meet challenges in the following areas:

- Poverty and demographic changes
- Educational success and employment
- The transformation of neighbourhoods
- Living-together and the fight against social exclusion, isolation and discrimination

The City manager signed the Administrative Policy on Business Continuity formalizing the development and deployment of the business continuity program across all municipal departments and inviting boroughs to comply. The business continuity approach is based on four main development principles:

- Responsible management
- State of preparedness
- Response capacity
- Organizational resilience

In March 2018, the municipal administration also presented its new Master Plan for Sports and Urban Recreation aimed at creating environments favourable to a physically active lifestyles among Montrealers. The plan focuses on connectivity with the goal of improving access to parks, public places, pedestrian streets, playgrounds and playing fields for all Montrealers. It is intended, specifically, to:

- Adapt the offer of summer and winter recreational activities to climate change;
- Promote greater universal access;
- Integrate the urban sports and outdoor recreation network into the smart and digital city strategy.

Finally, the 2017-2022 Cultural Development Policy uses the power of culture as a lever of social cohesion and economic development. It revolves around three major projects:

- Cultural and creative entrepreneurship for sustainable creation
- Digital technology promoting cultural experiences for citizens
- Living-together integrated into the fabric of cultural quarters

All city programs, paired with initiatives by companies and by academic and community stakeholders, are the building blocks of urban resilience in Montréal. The Urban Resilience Strategy is thus aimed at consolidating these cornerstones by offering complementary projects in areas not covered to the same extent by these actions.

This document thus integrates key elements of the main plans and policies adopted by the city in recent years, presenting new actions meant to meet challenges of resilience facing Montréal and Montrealers in the short, medium and long term.





1.4 ISSUES AND CHALLENGES RELATED TO RESILIENCE IN MONTRÉAL

The resilience of Montréal and Montrealers has long been put to the test by various challenges and disturbances. Often provoked by the climate context and the island's geographical location, but also by economic and sociopolitical factors, these issues are destined to become more complex with accelerated technological, climate and demographic change. Montréal's inclusion in the 100 Resilient Cities program was spurred by a desire to improve the city's capacity to deal with the shocks and stresses. This program recognizes the importance of developing Montréal's capacity to go beyond a reaction response to emergency situations. As well, the city must better understand the impact of stresses in the event of a shock, and how to mitigate these impacts in a preventive manner. These are the challenges Montréal will be called upon to deal with through the implementation of its strategy.

The **exceptional floods** that struck the north-west of the island of Montréal in April and May of 2017 tested Montrealers' collective resilience. The city has drawn lessons from that experience and has initiated a review process in collaboration with its external partners. The 1998 Ice Storm, until recently, remained the greatest shock that Montréal had ever sustained. The events of 2017 prompted a renewed focus on our vulnerability to natural hazards, particularly those arising from climate change. They also shed light on the importance of joint action in support of resilience by all levels of government, together with the appropriate land use management and environmental protection efforts.

Industrial and technological risks, particularly those related to the transportation and storage of dangerous goods across the city, represent another a source of growing concern to municipal authorities. The transportation of dangerous goods is a fast-growing business in North America, owing to the intensification of gas and oil production in the United States and Western Canada. The Lac-Mégantic disaster of 2013 and the explosion of a tank truck on autoroute 40 in Montréal in August 2016 served as tragic reminders of the risk of transporting these materials through urban environments. Recent pipeline reversal and construction projects also awakened the collective consciousness of the risks associated with spills and contamination. The storage of dangerous goods used daily by industries and businesses in Montréal also entails its share of risks to residents, businesses and surrounding ecosystems. These must be taken into account in current and future land use planning across Montréal, while striking a balance between economic, environmental and safety imperatives

The risk of a **terrorist attack** is also an issue for Montréal, just as it is for cities all across the world. Recent attacks in Europe and the United States, but also, closer to home, in Saint-Jean-sur-Richelieu (2014), at Parliament Hill in Ottawa (2014) and a Québec City mosque (2017), as well as cases of radicalization in Montréal and beyond, have placed populations and authorities in a state of alert. This new reality raises several challenges, including the need to better understand youth radicalization and effectively coordinate the response to a potential terrorist attack, while striking a balance between rights, liberties and public security. Montréal's resilience, in this context, may be supported by greater awareness of this risk among Montrealers, improved preparedness on the part of its administration and organizations, and the development of a civic culture of inclusion and solidarity.

In addition to real and potential shocks, a number of added stresses also affect Montréal, exerting a significant impact on the well-being of the city's population, both on a daily basis and in emergency situations. **Poverty and social inequality**, the aging of the population, the impacts of climate change and road congestion, among others, have an impact on Montrealers and their resilience potential. Certain vulnerabilities are insidious and can serve to compound the impacts of a shock. Such was the case in 2000, when a shortage of rental housing in Montréal mushroomed into a bonafide housing crisis in 2001 and 2002, resulting in the occupants of more than 60 mainly poor households being turfed out onto the street. The municipal administration and its community-based partners have learned to better assess and anticipate this stress. Programs are in place to react to a future housing crisis in Montréal and protect the city's vulnerable populations. The massive influx of refugee and asylum seekers across Montréal between 2015 and 2017 presented a new challenge for civil authorities in terms of coordination and housing on a large scale. This will continue to present a challenge in years to come, as will other challenges arising from the socioeconomic changes occurring in Montréal.

The rehabilitation of Montréal's **aging infrastructures** constitutes another major issue. Ensuring the proper function of the city's infrastructures on a daily basis is essential to the quality of life and safety of its citizens – but it's also key to Montréal's economic development. The municipal administration and its provincial and federal government partners have earmarked major investments in the next 10 years for much-needed work on the municipal water and transportation infrastructures. These work projects cause multiple inconveniences, particularly for road transportation on the Island of Montréal. They are not without risk and may be the source of significant disruptions for Montrealers. The boil water advisory in May 2013 is a good example. The preventive notice issued by the city applied to 1.3 million Montrealers over a period of 36 hours. It was provoked by work operations meant to bring the Atwater plant up to standard. To this day, this drinking water treatment plant, built in 1918, remains the largest plant in Montréal. The challenge of maintaining the delivery of services to the population during work on essential but aging infrastructures thus constitutes a major concern for Montréal, and that will continue to be the case for years to come.

BACKGROUND



2.1 ABOUT THE PROGRAM

The 100 Resilient Cities (100RC) program, an initiative of the Rockefeller Foundation, was created to help cities across the world deal with growing social, economic and environmental challenges in the 21st century. The 100RC program supports the adoption and integration of a common definition of urban resilience that includes not only shocks, but also stresses that erode the fabric of a city on a daily basis or in a cyclical fashion. By responding, at once, to shocks and stresses, a city thus develops its potential for collective and individual resilience, thus becoming better equipped to ensure the safety and well-being of its entire population.

2.2 MONTRÉAL AND THE PROGRAM

In December 2014, Montréal joined the international network of resilient cities. Through this program, the city receives technical assistance and financial resources for a period of two years in order to develop and implement its Urban Resilience Strategy, including the hiring of a director of resilience (called Chief Resilience Officer, or CRO). In January 2016, Ms. Louise Bradette was appointed Chief Resilience Officer in Montréal, with a mandate to further develop the city's resilience efforts.

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2.3 TIES WITH OTHER CITIES IN THE NETWORK

Team Canada Committee (Calgary, Montréal, Toronto and Vancouver):

Montréal became the first Canadian city to join the 100RC network, with Toronto, Calgary and Vancouver joining the following year. Spontaneously, a working group on best practices, called Team Canada, was established. It is made up of members of resilience teams from the network's four Canadian cities. At the urging of the École nationale d'administration publique, Montréal played host to a workshop on the governance of resilience in October 2017. Other collaborations between the four Canadian cities have since been initiated in public health, immigration, social resilience, and adaptation to climate change.

Athens-based meeting on cities and the global migration crisis:

Montréal was represented at the meetings on the global migration crisis held in Athens from September 7 to 9, 2016. These meetings fostered an ongoing discussion about challenges specific to cities, but more importantly on the solutions that must be put in place. The director of the Bureau de la résilience held discussions with representatives from Paris, Los Angeles, Medellín, Amman, Ramallah and Thessaloniki, specifically concerning the challenges of integrating immigrants. She also presented Montréal-based initiatives in this area, notably those put forward by the Bureau d'intégration des nouveaux arrivants à Montréal. A post-meeting report was produced.

Post-industrial cities committee:

One of the objectives of the resilience strategy adopted by the city of Glasgow, Scotland, was to establish a committee of post-industrial cities in the 100RC network for purposes of sharing and promoting best practices. Montréal has a seat on that committee, and its involvement makes it possible to stay apprized of emerging trends, notably in regards to the circular economy.

Urban Resilience Summit 2017:

More than 500 participants from the urban resilience field, including 80 CROs from the 100RC network, gathered in New York from July 25 to 28, 2017. This summit organized by 100RC allows cities in the network to discuss best practices and common challenges.

Informal meetings:

During the preparation of its strategy, the municipal administration drew on discussions with representatives from other cities in the 100RC network, notably Rotterdam (the Netherlands), Porto Alegre (Brazil), Santiago (Chile), Buenos Aires (Argentina) and Paris (France). These discussions covered similar challenges faced by cities.



2.4 MONTRÉAL'S URBAN RESILIENCE APPROACH

- **December 2014**

Montréal joins the 100RC network

PHASE 1

The objective, in this phase, was to deepen our understanding of resilience and the challenges specific to Montréal. At the conclusion of this process, a preliminary assessment of Montréal's resilience was produced, and research areas were identified for Phase 2.

- **January 2016**

Launch of Phase 1 work and appointment of the director of resilience (CRO)

"Resilience Program" workshop at Bonsecours Market in Montréal: This workshop constituted the first stage in the development of Montréal's Resilient City Strategy. More than 100 partners from a range of sectors gathered for a presentation on the 100RC initiative, the concept of resilience, and resilience challenges specific to Montréal.

The workshop saw Montréal's mayor officially appoint Ms. Louise Bradette director of resilience for Montréal.

- **May 2016**

Creation of the Bureau de la résilience

The Bureau was officially created, with a staff of three full-time employees working on the development of the strategy. Communications tools were put in place, including a Facebook page (www.facebook.com/ResilientMontreal) and a Web site (resilient.montreal.ca).

- **June 2016**

Creation of a steering committee and four working committees to guide the development of Montréal's Resilient City Strategy..

- **Summer 2016**

Workshop, perception survey, and data analyses

Several workshops were presented to survey perceptions among some 100 partners on elements of resilience in Montréal. Each partner produced an assessment of the different drivers and sub-drivers of resilience. They were also invited to identify priority areas of action to make Montréal more resilient. The same survey was widely distributed among the public, with more than 1,600 citizens responding.

- **February 2017**

Preliminary Resilience Assessment

The document entitled Preliminary Resilience Assessment was published in February 2017. It presents the work achieved in Phase 1, together with the research areas established for Phase 2.

PHASE 2

In Phase 2, the focus was brought to bear on a combination of technical assessments to go along with stakeholder engagement efforts aimed at developing the strategy and its action plan. During this phase, the municipal administration deepened its analysis based on the research areas established during Phase 1. This resulted in specific priorities and initiatives being set out to implement the strategy. The strategy describes the main resilience challenges and the opportunities the city intends to take advantage of, as well as the activities that the city and its partners will implement to strengthen resilience.

- **March – June 2017**

Diagnosis and research areas

Several meetings were held with staff in various city departments and external organizations in order to further develop the areas of research identified in Phase 1. These meetings led to the establishment of four resilience orientations and 12 objectives of the Resilience City Strategy.

- **June 2017 – June 2018**

Development, drafting and validation of the strategy and the action plan

A series of meetings and workshops were held to identify opportunities to establish resilience actions in Montréal.

- **June 2018**

Launch of Montréal's Resilient City Strategy and the related action plan.

MONTRÉAL'S RESILIENT CITY STRATEGY





3.1 VISION FOR MONTRÉAL

**AN ALERT, PROACTIVE
AND INCLUSIVE
COMMUNITY
ACTING ON SOCIAL,
ECONOMIC AND
ENVIRONMENTAL
CHALLENGES**



3.2 MISSION OF THE BUREAU DE LA RÉSILIENCE

The mission of the Bureau de la résilience complements that of the departments, offices and directorates in place at the city. The Bureau answers to the Direction générale adjointe à la qualité de vie, and its members work alongside civil security and business continuity teams, which are connected to the Direction de la sécurité civile et de la résilience. This positioning allows the Bureau de la résilience to gain a comprehensive vision of the city and its challenges.

In order to fulfill its vision of an alert, proactive and inclusive community, the Bureau de la résilience is committed to doing more than respond in emergency situations by taking the following steps:

- Improve anticipation of emerging risks across the city by integrating stresses and shocks into its analyses;
- Create sustainable and productive ties with a large contingent of Montréal organizations, specifically in relation to risk prevention;
- Serve as a vector of change within the municipal administration and in Québec's public safety community;
- Mobilize actors absent from conventional networks.

In order to achieve these steps, the Bureau de la résilience has a mission to:

- Develop and disseminate Montréal's Resilient City Strategy;
- Give the city an overall diagnosis in relation to resilience now and in the future, and identify the associated vulnerabilities;
- Prepare and update a coherent and coordinated joint action plan;
- Pilot specific projects assigned to the Bureau, and support other projects with a direct impact on the development of resilience capacity among Montrealers;
- Follow up on outcomes of the action plan in order to assess its effectiveness;
- Advise the municipal administration on integrating the notion of urban resilience into its policies, plans and strategies;
- Promote the sharing of best practices with internal and external partners involved in the strategy.

While Montréal's Resilient City Strategy, by definition, is comprehensive and integrated, its implementation cannot be the work of a limited number of people. Its objectives will only be achieved through a series of activities carried out by the municipal administration in concert with external organizations and Montrealers alike.

3.3 ORIENTATIONS AND OBJECTIVES FOR A RESILIENT CITY

The municipal administration has identified four major orientations to articulate Montréal's Resilient City Strategy. These orientations stem from work and meetings carried out during phases 1 and 2 of the project:

1 TAKE ACTION IN SUPPORT OF A UNIFIED AND SAFE COMMUNITY

2 TAKE ACTION TO PROTECT OUR LIVING ENVIRONMENT

3 TAKE ACTION TO MAINTAIN A DIVERSIFIED AND INNOVATIVE ECONOMY

4 TAKE ACTION TO PROMOTE INTEGRATED GOVERNANCE IN THE SERVICE OF THE COMMUNITY

The first three orientations target broad issue categories likely to affect a city, while the final orientation takes aim at governance issues in order to ensure appropriate and effective action, particularly in emergency situations.

These four orientations are supported by 12 objectives targeting challenges specific to Montréal. They represent elements of resilience in need of improvement. The Bureau de la résilience thus hopes to better meet these challenges in the years to come, and its strategy includes a concrete action plan.

In the following pages, the four major orientations are defined, and the objectives and actions intended to make Montréal resilient are explained.



ORIENTATION

TAKING ACTION TO SUPPORT A UNITED AND SAFE COMMUNITY

Our city has long been recognized for its tradition of mutual aid. The social economy sector – which is already well established in Montréal and supported by various government programs – offers a broad array of services adapted to the specific needs of the most disadvantaged. Montréal's rich community network, strongly rooted in its neighbourhoods, has spurred the development of a considerable capacity to adapt to and thus meet citizens' emerging and changing needs. What's more, neighbourhood roundtables have a mandate to bring together local actors (community, institutional, political, private, and citizens) and offer them a broadly representative local advisory body. Together, these actors draw up an overview of neighbourhoods, determining key action priorities related to housing, urban development, food and urban security, the environment, transportation, and so on. These neighbourhood roundtables place citizens at the heart of their approach and mobilize neighbourhoods to work on the development of united and safe communities.

This sense of solidarity must be cultivated on a daily basis and enriched to ensure the safety of all Montrealers, particularly the most vulnerable. In a context where Montréal faces a range of social and environmental challenges, there is significant risk of crises situations occurring. Montréal's population presents shortcomings in regards to the individual state of preparedness for disaster. Heightening public awareness of the risks that present a threat and the means to prepare and react accordingly must be a priority, therefore, and the same can be said for establishing mechanisms to promote solidarity and inclusion.

In emergency situations, as in risk prevention, knowledge of best practices and social solidarity become powerful drivers of resilience for a community. These capacities among Montrealers must be supported and further developed on a daily basis in order to highlight the proactive role they can play in risk prevention and in emergency situations.

OBJECTIVE A

Strengthen the community's capacity to adapt and react to natural and anthropogenic risks

The community is the first to be affected by the impacts of natural and anthropogenic catastrophes: lost property, income and time; compromised quality of life, health and even lives in some cases. Yet, on a day-to-day basis, the population is relatively unaware of these risks. The findings of the Baromètre CIRANO 2017 survey on risk perception are revealing in this regard. Only 13% of the Quebecers surveyed viewed floods, earthquakes and forest fires as a personal risk, and less than a third deemed terrorism to be a significant or highly significant risk.

Greater shared awareness is necessary, since, according to the Intergovernmental Panel on Climate Change (IPCC), natural catastrophes will be increasingly frequent, diversified and intense in decades to come. Montrealers are only just now beginning to understand natural catastrophes and their social, economic and environmental impacts. However, among the population, little is known, still, about the multiple emerging risks and their probabilities and impacts. These include epidemiological and seismic risks, or risks related to cyberterrorism. It is important, nay essential, to further heighten this awareness, without being alarmist. The state of preparedness and knowledge of probable risks attest to this. Simple gestures, such as knowing what to do, who to call, what to prepare, where to go (if applicable) and above all, the ability to assume individual responsibility so as not to hinder emergency services in the crucial early hours of a disaster can make all the difference.

In addition to being able to react appropriately in an emergency situation, the community must also be capable of vigilance and must know what actions to take to protect fellow citizens. The simple fact of knowing the warning signs of potentially dangerous situations (extreme weather event, radicalization, package left without surveillance) or the proper alert procedure constitutes an attitude geared to action.

ACTIONS

1 Promote awareness and social engagement among young Montrealers in connection with climate change and urban resilience

In the summer of 2017, the Bureau de la résilience participated in the pilot phase of Mission Atmosphere, a leadership program on climate change offered to young Montrealers aged 14 to 17. Organized by Environment and Climate Change Canada (ECCC) and the Groupe uni des éducateurs-naturalistes et professionnels en environnement (GUEPE), Mission Atmosphere has a mandate to raise awareness of climate change among youth and pique their curiosity about atmospheric sciences and urban resilience. Two initial cohorts of young francophones and anglophones were trained at the Biosphère in the summer of 2017.

In 2018, organizers hope to improve the Mission Atmosphere program and broaden its scope of youth leadership and civic involvement. To help ECCC and GUEPE improve this project, the Bureau de la résilience has proposed a broader collaboration. An initial meeting with partners interested in this action will serve to:

- Present the results of the pilot project, the objectives of the program and its desired scope;
- Establish needs and available resources;
- Set out an action plan.

Principal partners: Environment and Climate Change Canada (ECCC), Groupe uni des éducateurs-naturalistes et professionnels en environnement (GUEPE), Ville de Montréal (Bureau de la résilience, Service de la diversité sociale et des sports, Service de l'environnement), and other partners to be determined.

Time horizon: medium term

2 Develop emergency preparedness and community resilience workshops

The Coopérative de Solidarité Transition NDG was founded in 2014 with the aim of fostering collective resilience in the neighbourhood of Notre-Dame-de-Grâce. In 2017, a new project was put forward, involving a series of presentations and public training sessions. The objective was to heighten awareness and encourage citizens to create a 72-hour emergency kit and carry out awareness exercises, but also to promote the development of community-based networks, for example through efforts to know your neighbours and the neighbourhood resources that are available. This pilot project promoting a state of preparedness among citizens, a knowledge of risks, and social cohesion will be supported by several city departments, and it could be duplicated in other Montréal sectors.

Major project implementation steps:

- Participate in the development of the training program on the following themes: preparation of an emergency kit; ensuring your water supply; emergency recipes and foods; emergency housing; first aid and health; hygiene; communication; heating and energy; social and psychological resilience;
- Present the state of preparedness of the city and the borough to citizens as part of the training program;
- Assess the success and scope of the training sessions using a questionnaire with performance indicators, distributed to participants at the end of the sessions;
- Duplicate the project in other boroughs, based on specific interests and needs.

Principal partners: Transition NDG, Ville de Montréal (Bureau de la résilience, Centre de sécurité civile), Côte-des-Neiges–Notre-Dame-de-Grâce borough.

Time horizon: medium term

3 Support organizations that promote citizen engagement and volunteer training

In order to develop competencies among citizens intent on volunteering in the event of a disaster and to empower them to play an important role, the Centre de sécurité civile, in collaboration with key actors at the community level, will support awareness activities in conjunction with Civil Protection Week, which runs in May of every year, as well as promote organizations offering emergency preparedness training on a year-round basis. With training and support from organizations, these citizens, where required, will be able to support the city's response in the event of disaster.

In order to meet this objective, Montréal is committed to:

- Supporting volunteer organizations and associations that offer emergency measures training and support;
- Participate in and develop activities for citizens with the aim of promoting risk awareness;
- On the city's Web site, promote organizations that offer training sessions and emergency measures support.

The creation of a training session on actions that save lives is an example of a project the Bureau de la résilience will support in the years ahead. Under this project put forward by Montréal's health and social services network, a public training session on proper responses to emergency situations will be offered. The training session will be geared to youth and adults alike.

Principal partners: Ville de Montréal (Centre de sécurité civile, Bureau de la résilience), Montréal's health and social services network, volunteer organizations, and associations to be determined.

Time horizon: medium term

Montréal in action: Centre for the Prevention of Radicalization Leading to Violence

The Centre for the Prevention of Radicalization Leading to Violence (CPRLV) is a pioneering initiative put forward by the city and the first of its kind in North America. It is the first independent non-profit organization whose objective is to prevent the phenomenon of radicalization leading to violence, and support people affected by this reality: individuals who've been radicalized or are in danger of being radicalized, their loved ones, teachers, professionals, responders, and community outreach workers. The CPRLV also works to prevent hate crimes and incidents and support victims of such acts by ensuring that they receive care.

In order to meet some of these objectives, the CPRLV launched the following initiatives:

- The "What if I Was Wrong? When we talk we learn!" campaign geared to youth and adults. Its objective is to promote aptitudes that favour the process of resilience and the development of critical thinking as protection factors against radical and extremist discourses leading to violence.
- The Mon histoire project traces the process of identity formation and the impact of violent radicalization. This project is meant to serve as an educational support tool for purposes of prevention. It is based on testimonials from youth and siblings directly affected by violent radicalization. It is also intended to allow professionals working with youth (teachers, educators, community outreach workers, social workers, etc.) and their loved ones (families, siblings, peers) to become reflexive actors, break their silence, and reassume a mobilization role, both educational and social, within our society.

Inspiration: New York's CERT program

New York's CERT (community emergency response teams or NYC CERT) teams are made up of dedicated volunteers who help prepare their neighbours and communities for various types of catastrophes. NYC CERT volunteers are trained to support efforts by New York's first responders. Outside of emergency situations, CERT New York teams educate communities about emergency preparedness, working in connection with the Ready New York program and building community emergency response networks via the NYC Citizen Corps program.

Training sessions on life-saving actions by the French Red Cross

The French Red Cross's Summer caravan fans out across the streets of France offering free introductions to first response actions, in a warm and family-friendly atmosphere. Three training sessions are offered to the public; Alerter-Masser-Défibriller, Initiation à la réduction des risques, and Initiation aux premiers secours et comportements qui sauvent. Since the Caravan was first created in the summer of 1999, close to 47,000 people have been introduced to life-saving actions.

OBJECTIVE B

Preserve an environment that meets Montrealers' essential needs

A resilient community's assets include the autonomy of its people, the resources at their disposal, and their capacity to improve their living conditions. Montréal belongs to a society that, on balance, meets the basic needs of its citizens. That said, poverty is a reality in the city, as 17.9% of the population within the agglomeration of Montréal live below the low income cut-off, according to data from the 2016 Statistics Canada survey. Many Montrealers don't have access to proper housing in terms of size and condition, have difficulty obtaining fresh and nutritious foods, live in isolation, or experience difficulties related to social and cultural integration. These situations, if left unchecked or unmitigated, can lead to true crises or exacerbate the impacts of a disaster.

New initiatives make it possible to better understand and target Montrealers' basic needs. In June 2017, the municipal administration launched its first Social Development Policy. In December of the same year, Montréal became the first French-language city to form a food policy council. In March 2018, the "Réflexe-Montréal" framework agreement was concluded between the Government of Québec and the Ville de Montréal. This agreement, which concerns the transfer to the city of powers and budgets related to housing development across Montréal, represents a major lever for retaining families and improving the quality of life of Montrealers. In addition, the municipal administration recently announced its 2018-2020 Action Plan on Homelessness. The plan favours a comprehensive approach to meeting the needs of people living with homelessness or at risk of becoming homeless, notably as they pertain to housing through the plan to create 950 social and community housing units.

These types of initiatives and agreements support resilience capacity among individuals and, by extension, among Montréal's communities. Other initiatives address the basic needs of Montrealers, particularly those related to the prevention of emergency situations, and these efforts further support initiatives and ensure consistent action by the city.

ACTIONS

4 Consolidate the housing stock and emergency services for vulnerable clientele

The agglomeration of Montréal has temporary housing resources in place for populations in the event of a major disaster or disruptive event across its territory. However, better knowledge of existing resources and information-sharing would facilitate emergency first response measures.

In order to meet these challenges while ensuring the viability of these resources, the Centre de sécurité civile intends to:

- Annually update data on emergency shelters in boroughs and reconstituted cities;
- Assess the energy independence of emergency shelters and centres in the agglomeration of Montréal;
- Identify large-scale emergency housing solutions across the city.

The concerned city departments, in advance of crises, favour improved coordination and communication between government and community-based authorities. Integrated planning and a review of protocols will make it possible to anticipate situations where minor impacts have the potential to become major impacts.

Principal partners: Ville de Montréal (Centre de sécurité civile, Bureau de la résilience, Service de la diversité sociale et des sports/Protecteur des personnes en situation d'itinérance), Sun Youth, the Red Cross, the Office municipal d'habitation de Montréal (OMHM), and the Société d'habitation et de développement de Montréal (SHDM).

Time horizon: medium term

5 Expand the Quartier intégré (QI) project

The municipal administration made commitment to chart a course for sustainable development more than 10 years ago, in collaboration with the broader Montréal community. In order to ensure that departments coordinate their actions in this regard, the city implemented the Quartier intégré project in three Montréal sectors, notably Hochelaga, Sainte-Marie and Montréal-Nord. This project calls for actions in these target neighbourhoods identified as vulnerable on three levels: economic, social and environmental.

Following the assessment of the *Quartier intégré* project (currently in progress), other Montréal sectors could be targeted by the Bureau du développement durable. In this context, le Bureau de la résilience will collaborate with the Bureau du développement durable in an effort to include notions of community resilience when selecting the next target neighbourhoods, notably by using:

- Cartographic results of the socioeconomic vulnerability index;
- The assessment of Montrealers' social capital.

Teams from both Bureaus will meet to:

- Ensure the relevance of shared data in connection with the program objectives;
- Share knowledge and best practices in order to promote the sustainable and resilient development of Montréal's neighbourhoods;
- Identify new avenues of joint intervention in the longer term.

Principal partners: Ville de Montréal (Bureau du développement durable, Bureau de la résilience).

Time horizon: medium term

6 Promote the resilience of the food system on the island of Montréal

In 2018, the city's Service du développement économique (SDÉ) and the Ministère de l'Agriculture, des pêcheries et de l'Alimentation du Québec (MAPAQ) will conduct a study on the economic potential of commercial urban agriculture across the island of Montréal. This study will result in the establishment of a commercial urban agriculture support strategy and the implementation of an action plan specific to the agglomeration of Montréal.

These initiatives will make it possible to:

- Validate related opportunities in this field and its interaction with the social economy sector;
- Support the city's decision-making as it relates to food system resilience.

In order to encourage these initiatives, the Bureau de la résilience intends to:

- Sit on the city's internal committee on urban agriculture, which will support the work of the SDÉ and MAPAQ;
- Widely share the findings of the study on the assessment of commercial urban agriculture's potential in Montréal with its current and future partners;
- Foster collaborations in connection with food supply resilience in the event of a situation involving a disruption.

Principal partners: Ville de Montréal (Service du développement économique, Service de la diversité sociale et des sports, Bureau de la résilience), Ministère de l'Agriculture, des pêcheries et de l'Alimentation du Québec, Conseil de politiques alimentaires de Montréal, and other partners to be confirmed.

Time horizon: long term

Montréal in action: A joint response to the needs of asylum seekers

In the past two years, Montréal has seen new needs emerge in connection with the reception of asylum seekers. This trend is expected to continue in the years to come as a result of international and climate-related issues. The United Nations High Commissioner for Refugees estimates that 25 million to 1 billion people will be displaced due to climate change by 2050.

The Bureau d'intégration des nouveaux arrivants de Montréal (BINAM) has a mandate to coordinate the municipal administration's efforts in this regard. A special response plan for asylum seekers was produced in the fall of 2017 and is pending approval. Its aim is to better support actions by various Montréal stakeholders, in collaboration with the concerned provincial and federal authorities.

This plan is meant to:

- *Anticipate an exceptional migration event and organize a mobilization;*
- *Mobilize and coordinate the city's internal resources and maintain ties with government and community-based resources.*

In response to the increased influx of asylum seekers, the municipal administration, through BINAM, is working to ensure coordinated and cohesive action in connection with the reception and integration of immigrants across the city. In accordance with the principles of a sanctuary city, municipal authorities are ensuring that the necessary actions are taken to facilitate the reception and integration of asylum seekers by optimizing their effectiveness.

OBJECTIVE C

Develop mutual aid and inclusion mechanisms to promote solidarity between citizens and reduce vulnerabilities

Solidarity and civic-mindedness between citizens are powerful mechanisms of resilience. Seniors and people with disabilities living in isolation, new immigrants and First Nations people without social networks, overwhelmed young families, and the homeless – all stand to benefit from regular and positive contact with people in their environment.

The World Health Organization (WHO) deems social support to be a major determining factor in individual physical and mental health. By promoting civic participation at the local level, or simply by fostering good neighbourly ties to break isolation, the city can make a vital contribution to quality of life in urban communities and to the vitality and safety of neighbourhoods.

Studies conducted in some American and Asian cities have demonstrated that a strong culture of mutual aid can favour the adoption of appropriate reflexes in emergency situations – for example a major summer heat wave or a situation calling for the mass evacuation of a territory – as well as a more efficient return to normalcy. Social ties can thus play an essential role in resilience capacity among individuals and communities.

Numerous organizations and institutions collaborate with the city and with the provincial and federal governments in an effort to maintain equitable access to quality social infrastructures (schools, libraries, sports facilities, etc.) and social environments (parks, green alleys, community gardens, etc.). Municipal initiatives have also been launched to fight prejudice towards certain groups of individuals, ensure universal access to services, and promote the development of a broader Montréal community that is safe, fair and sustainable.

ACTIONS

7 Foster the development of social capital among Montrealers in order to strengthen community resilience

Human relations constitute an essential component in the quality of life of citizens. Often referred to as social capital, these relations are based on trust between individuals, the strength of solidarity networks in a society, and the willingness of citizens to practice mutual aid and cooperation.

In order to support social cohesion and resilience in Montréal communities, the Bureau de la résilience will develop social capital indicators adapted to the Montréal context and integrate them into quality of life index currently under development at the city. These indicators will:

- Measure social capital in Montréal neighbourhoods more closely using data from Statistics Canada's 2016 Census of Population Program
- Improve the reflection process underway at the Service de la diversité sociale et des sports in relation to quality of life and urban safety;
- Support local initiatives and share initiatives developed by other cities in the 100RC network.

In addition, a special initiative will be carried out in collaboration with the city's Protecteur des personnes en situation d'itinérance, as part of an effort to establish contact with Montrealers who are most difficult to reach.

Principal partners: Ville de Montréal (Bureau de la résilience, Service de la diversité sociale et des sports, Service du développement économique/Montréal en statistiques), and other partners to be determined.

Time horizon: medium term

8 Understand and support the process of resilience and the integration of immigrants into Montréal life

Created in February 2016, the Bureau d'intégration des nouveaux arrivants de Montréal (BINAM) puts forward actions meant to accelerate the social and economic integration of new immigrants and thus facilitate their positive contributions to Montréal society.

In collaboration with BINAM, the Bureau de la résilience is taking part in the Building Migrant Resilience in Cities (BMRC) research project undertaken by researchers from Québec and Ontario. BMRC's objective is to document, analyze and compare resilience capacity among immigrants as well as the challenges they face in various Canadian cities.

The BMRC has already allowed the Montréal network to identify promising research projects. In the medium term, this network aims to:

- Finance exhaustive and comparative studies;
- Build bridges between public, community and academic initiatives in Québec and Ontario;
- Support decision-making processes within cities in the network, specifically in this area, by integrating an improved understanding of resilience among immigrant communities.

Principal partners: Ville de Montréal (Bureau d'intégration des nouveaux arrivants de Montréal, Bureau de la résilience) Montréal's Building Migrant Resilience in Cities network (Concordia University, Université du Québec à Montréal, Table de concertation des organismes aux services des personnes réfugiées et immigrantes, Centraide, and others).

Time horizon: medium term

9 Compile a list of persons in vulnerable situations and develop means of communication

The Centre de sécurité civile, the Bureau de la résilience and its partners plan to establish a strategy for reaching people in vulnerable situations so as to transmit specific messages and provide adapted support in the event of a major disaster.

A list of people in vulnerable situations based on specific criteria already exists in the health care network. In order to specify prevention initiatives and actions with vulnerable clientele not targeted by the health care network, the city, through its municipal departments, wishes to establish a mechanism to:

- Develop relevant indicators of criteria for vulnerability, based on probable disasters, making it possible to target specific populations;
- Adapt messages and means of dissemination with external organizations offering services adapted to vulnerable clients and holding client databases, in order to effectively communicate with those clients in the event of a major disaster;
- Identify geographical sectors where populations in vulnerable situations are concentrated, based on the type of disaster;
- Develop emergency response and communication protocols for these populations.

Principal partners: Ville de Montréal (Service de sécurité incendie de Montréal, Centre de sécurité civile, Bureau de la résilience), Direction de la santé publique, CIUSSS du Centre-Sud-de-l'Île-de-Montréal, Urgences-santé, Société de transport de Montréal, and other community partners to be determined.

Time horizon: medium term

Montréal in action: A Montréal-specific approach to urban safety

A strong sense of safety prevails on the streets of Montréal and in the city's neighbourhoods. However, some urban safety problems persist, particularly among youth. The phenomenon of street gangs is not new to Montréal, but it remains a concern, notably due to intra-gang violence and the recruitment and sexual exploitation of young girls. New problems specific to youth have also emerged in Montréal and beyond

- Cyberbullying and cybercrime
- Youth radicalization leading to violence

In order to better meet these urban safety challenges affecting Montréal's youth, a new project was put forward

by the Service de la diversité sociale et des sports and members of the Réseau d'échange et de soutien aux actions locales (RÉSAL), with support from the Ministère de la Sécurité publique du Québec.

The RÉSAL project is intended to:

- Support Montréal communities taking preventive action aimed at curbing youth violence;
- Improve communication between community outreach workers and Montréal police officers in order to foster a good knowledge of the current problems and identify new actions;
- Offer training on specific issues related to youth violence (street gangs, sexual exploitation, bullying and radicalization).



ORIENTATION 2

TAKE ACTION TO PROTECT OUR LIVING ENVIRONMENT

The quality of life of Montrealers depends largely on the quality of their day-to-day living environment. This environment is made up of various infrastructures that help maintain good living conditions across the city: on the one hand, green infrastructures favour biodiversity, ecological practices and urban agriculture, thus promoting the health and well-being of the population; while grey infrastructures, including buildings, water supply and sewer networks, and artworks, support essential public services. These assets form a shared heritage that's key to the life of the population, Montréal's economic vitality, and our capacity to deal with recurring or exceptional disturbances.

Recurring disturbances include the Montréal climate. Marked by harsh winters and significant seasonal temperature variations, our climate, each year, affects both the population of Montréal and its infrastructures. What's more, climate change is likely to exacerbate natural phenomena, such as heavy rains, heat waves, violent storms, drought, spring flooding, and higher average temperatures. In order to sustain resilience in our living environments, green and grey infrastructures must be protected and made more resistant, not only to ongoing stresses (pollution, freeze-thaw cycles, etc.), but also to the natural and anthropogenic hazards likely to affect them.

Land use as well as green and grey infrastructure planning must support our collective development, therefore, and take into account risks and their potential environmental and social impacts.

OBJECTIVE A

Ensure improved consideration of risks in land use and infrastructure planning

Ongoing climate changes have a definite impact on the city, spurring efforts to identify means to ensure that urban planning is designed to mitigate the effects of climate change on our daily life and limit the consequences of extreme weather events. At the same time, vulnerabilities intrinsic to the city – like Montréal's location in a seismic zone or the location of some neighbourhoods in flood-prone areas – must inform responsible infrastructure planning based on risks.

Urban planning solutions constitute an important resilience factor, as they can help reduce certain chronic stresses. *The Guidelines for New Development in Proximity to Railway Operations*, a document published in 2003 and updated in 2013 by the Federation of Canadian Municipalities and the Railway Association of Canada, is a good example. These guidelines are aimed at preventing and resolving differences that may arise when people live or work in proximity to railway installations, as is the case in Montréal. Urban planning can also play a role in mitigating the consequences or facilitating disaster response by improving access to emergency services, for example, or facilitating the evacuation of populations.

The risk profile across the city, specifically as it pertains to the increased probability of known hazards (e.g., frequency of spring flooding) or new natural or anthropogenic threats (e.g., storage of dangerous goods), must be integrated into resilient, sustainable and safe land use planning. New development projects can help prevent the emergence of added vulnerabilities or ensure that populations are not exposed to unacceptable levels of risk. As well, more must be done to monitor current risks across the city so as to prevent harmful impacts. These complex issues come under the purview of multiple municipal departments and levels of government, and they present a major challenge for Montréal.

ACTIONS

10 Establish methods, standards and regulations pertaining to resilient construction and the integration of green infrastructures

The spring floods of 2017 highlighted the need for joint action by municipal departments when it comes to resilient city-wide planning. In order to meet this challenge and better integrate the notion of urban resilience into construction methods, standards and regulations at the city, the Centre de sécurité civile and the Bureau de la résilience will establish a committee to initiate a planning process, in collaboration with several departments and external partners.

This committee will have a mandate to:

- Study global methods of planning, adaptation and mitigation vis-à-vis natural hazards and, most importantly, floods;
- Develop a planning model applied specifically to Montréal's reality;
- Issue a report with recommendations on adaptation and mitigation measures to put in place.

Principal partners: Ville de Montréal (Bureau de la résilience, Centre de sécurité civile, Service de la mise en valeur du territoire, Service des infrastructures, de la voirie et des transports, Service du développement économique, Service de l'eau, Service de l'environnement), Kheops consortium, and other partners to be determined.

Time horizon: medium term

11 Regulate the management of dangerous goods at fixed sites across the agglomeration of Montréal

Amid a context of urban densification, the harmonious and safe cohabitation between industries and residential neighbourhoods poses an ongoing challenge. Several facilities across the city produce, store or use dangerous goods.

The Centre de sécurité civile was given a mandate to develop a regulatory civil security framework for facilities at significant risk. The framework will help ensure public safety and manage major industrial risks in connection with land use management.

An agglomeration-wide by-law will be aimed at meeting the following objectives:

- Draw up a portrait of major technological risks across the agglomeration of Montréal;
- Develop the urban planning tools to regulate urban development in proximity to facilities at significant risk;
- Improve the state of preparedness of emergency first responders;
- Promote a safe living environment for Montréal's population.

Principal partners: The Direction de l'aménagement at the boroughs of Rivière-des-Prairies-Pointe-aux-Trembles, Saint-Laurent, Sud-Ouest and Ville de Montréal-Est, Service de sécurité incendie de Montréal, Service de mise en valeur du territoire, Service de l'environnement, Service du développement économique, Service des affaires juridiques, Centre de sécurité civile, Polytechnique Montréal, Association industrielle de l'Est de Montréal, Direction de la santé publique, and the Major Industrial Accidents Reduction Council.

Time horizon: medium term

OBJECTIVE B

Carry out more exhaustive cost-benefit analyses on mitigation measures

Ecosystems across Montréal render truly "essential ecological services" to the public. Every day, they play a part in improving the physical and mental health of citizens by helping purify air, providing spaces for relaxation and outdoor sports activities, and making the urban landscape more attractive.

These ecosystems help regulate temperature more effectively by reducing urban heat island effects, facilitate stormwater management by increasing ground water retention capacity, and fight atmospheric pollution. They represent potentially effective mitigation measures that will protect Montrealers against the impacts of natural catastrophes (floods, extreme heat, high winds, etc.).

In order to assess and establish the most appropriate mitigation measures, the municipal administration will work with experts to carry out a series of analyses of the most prevalent hazards in Montréal. These analyses will make it possible to better determine the costs of the measures that could be put in place, but more importantly to assess their actual potential for reducing impacts on populations, the environment and infrastructures. These measures will not eliminate catastrophes, however, which is why it's important to remain vigilant about the existence of risk, even if these developments make them less frequent and destructive.

Montréal in action: Green infrastructures on Avenue Papineau

Closely associated with the development of the new Complexe environnemental de Saint-Michel, the project to redevelop Avenue Papineau is aimed at using an experimental method to optimize stormwater management.

In 2017, the municipal administration built two connected bioretention basins along the eastern side of Avenue Papineau over a distance of two kilometers. These basins collect stormwater runoff along the road and sidewalks.

With the permanent integration of a green infrastructure in the public domain, connected to a key transportation project, the municipal administration is:

- *Innovating and thus meeting its sustainable development and urban resilience objectives;*
- *Helping reduce heat island effects through a massive greening project.*

In addition, starting in 2018, a monitoring program will track the development of optimal management practices in order to foster new expertise at the city.

ACTIONS

12 Analyze the costs-benefits of flooding mitigation measures

Due to the complexity of waterways and the uncertainty of hydrological forecasts, several traditional prevention solutions, such as the construction of dams, have often generated unexpected and undesirable impacts. These include the ecological fragmentation of waterways and wetlands, the transfer of risk to other sectors, or the exacerbation of impacts on protected areas in the event of a breakdown. This uncertainty is now amplified by climate change.

In order to establish prevention solutions that will make the agglomeration of Montréal more flood resilient, it is essential to improve our knowledge of probabilities and vulnerabilities present across the city. This increased recognition of risks will allow us to better adapt prevention measures in land use development as well as establish structural measures and green infrastructures.

From this perspective, the municipal administration must do a better job of assessing its vulnerability to floods and identifying means to reduce that vulnerability and thus improve overall resilience. In order to achieve this, the municipal administration will develop an analysis intended to:

- Establish vulnerability criteria in a geographically limited sector;
- Quantify the impacts of the 2017 floods, based on vulnerability criteria, and thus forecast the potential impact of future floods;
- Identify and classify potential mitigation measures and strategies based on the following resilience strategies: profitability, social acceptability, sustainability, environmental impact, flexibility in regards to climate change and a so-called “no regret” measure.

Principal partners: Ville de Montréal (Bureau de la résilience, Centre de sécurité civile), and other partners to be determined.

Time horizon: medium term

13 Study the costs-benefits of measures to reduce heat island effects

The INSPQ, in collaboration with ECCC, initiated a decision support project geared to cities. This tool is used to determine which urban planning actions are most likely to reduce heat island effects, for example planting vegetation, the conversion to white roofs or green roofs. This tool will serve to estimate the expected reduction in temperature, based on the type of action, and support decision-making based on scientific knowledge.

Major steps in the project:

- Carry out land modelling across the city;
- Produce models for large Canadian cities, including Toronto and Vancouver;
- Develop a decision support tool geared to municipalities.

Principal partners: Institut national de santé publique du Québec (INSPQ), Environment and Climate Change Canada (ECCC), Ville de Montréal (Bureau de la résilience, Centre de sécurité civile)

Time horizon: in progress

Inspiration: Rotterdam Water Square in Montréal

The concept of the water square, developed in Rotterdam, denotes the construction of true public spaces and/or recreational infrastructures in neighbourhoods, capable of accepting stormwater runoff by serving as water retention basins. Rather than invest in two dedicated infrastructures, therefore, the same infrastructure performs dual functions.

The Service de l'eau de la Ville de Montréal is currently working to build Montréal's first water square. This pilot project could help make the existing sewer network more resilient, without a corresponding rise in costs, while improving living environment for residents.

A water square has the capacity to offer recreational, sports and educational activities. It also allows various actors (developers, consultants, elected officials, citizens, etc.) to collaborate in a spirit of innovation in order to meet the objective of the city's Master Plan. By taking into consideration the fact that in new neighbourhoods, 10% of lands must be used for parks, the concept of the water square is an opportunity that holds good potential for repeatability across the city.

OBJECTIVE C

Develop and sustain infrastructures to ensure the maintenance of services and essential systems

Municipal infrastructures, like those managed by other levels of public administration or private enterprises, are a key component of Montréal's economic dynamism and the quality of life that the city offers its population. Essential to the proper function of the city and its citizens, electric power, transportation, telecommunications and water systems often function interdependently. Many municipal infrastructures across the city are aging and have been poorly maintained over the years. Others have seen their residual capacity progressively reduced with the development of new neighbourhoods, thus making them particularly vulnerable to hazards. Sudden breakdowns and planned work projects alike can have major consequences for Montréal, both financial and in terms of activities carried out by the city and its citizens.

In October 2016, the related municipal departments revealed that 45% of Montréal's road network – more than 1,822 kilometres of road – was in poor or very poor condition. What's more, 22% of the sewer network and 13% of the drinking water supply system are in need of repair. In order to deal with the situation, the municipal administration adopted an action plan in 2015 calling for the repair of 5,000 kilometres of streets and water connections over 10 years. In April 2017, the governments of Québec and Canada added to the investments already made under the Montréal Water Strategy by announcing that more than \$84.4 million would be earmarked to improve the water supply system and the sewer network in the Montréal region.

In order to ensure the proper function of major urban systems across the city, the municipal administration is not only required to maintain its infrastructures, but it must also anticipate emerging risks so as to better manage their consequences for the population. To adequately support decision-making by public and private authorities, it is necessary to gain a clearer picture of climate change's potential impact on certain networks, identify the proper adaptation measures to implement, and conduct cost-benefit analyses of these actions. What's more, the integration of new technologies in the development and day-to-day management of networks can give rise to new vulnerabilities. Examples of recent innovations with the potential to optimize network performance, but also render networks more vulnerable, include the use of massive open-source data and smart counters, the implementation of remote control systems for infrastructures, and the advent of the Internet of Things and artificial intelligence.

ACTIONS

14 Promote the resilience of critical infrastructures across Montréal and their adaptation to climate change

In 2015, the municipal administration adopted its first Climate Change Adaptation Plan for the Montréal Agglomeration in collaboration with municipal departments and local administrations. This plan, now mid-way through its implementation, is aimed at assessing the effects of climate change on the agglomeration and establishing the necessary measures to minimize its impacts, notably on city infrastructures.

In conjunction with the development of this plan, some city departments and a number of private and public partners have been working jointly for the past few years on making critical infrastructures across the city more resilient. In order to formalize and improve this collaboration, the Centre de sécurité civile and the Bureau de la résilience proposed the creation of the Conseil des réseaux d'infrastructures et de services essentiels (CRISE). The CRISE would have a mandate to:

- Review joint operational procedures involving municipal civil security authorities and managers of emergency measures for critical infrastructures;
- Develop and track resilience indicators applied to infrastructures across Montréal in collaboration with the Service de l'environnement;
- Share best local and national practices in climate change adaptation and the cyber-resilience of networks, in particular.

In addition, the CRISE will support the work in progress and explore potential future collaborations under a new agreement between the city's Service de l'environnement and Ouranos, the Consortium on Regional Climatology and Adaptation to Climate Change.

Principal partners: Ville de Montréal (Bureau de la résilience, Centre de sécurité civile, Service de l'environnement, Service de l'eau) Bell Canada, Energir, Hydro-Québec, Ouranos, Réseau de transport métropolitain, Société de transport de Montréal, and other partners to be determined.

Time horizon: medium term

15 Contribute to the resilient development of the smart city

Montréal is proud to be recognized as a hub for digital technologies, and the municipal administration strives to become a world leader among smart cities. The Bureau de la ville intelligente et numérique has been instrumental in the growth of digital technologies across the city, launching its first action plan in 2015. In order to ensure the resilient development of the smart city, risk management related to the security of new innovations remains a priority for the city's Service des technologies de l'information.

The challenges in this area are manifold. Since 2017, the city has put forward a pair of initiatives intended to better prepare municipal employees and departments to meet these challenges:

- Establish an initial campaign to raise awareness of cybersecurity risks and best practices for all municipal employees;
- Partnership agreement with the Smart Cybersecurity Network (Serene Risc) housed at the Université de Montréal to create a research and development hub for cybersecurity and IT resilience, business intelligence and big data, artificial intelligence, the Internet of Things, and telecommunications.

In order to build upon this momentum, the Bureau de la résilience and its partners intend to initiate a technological pilot project aimed at:

- Carrying out a proof of concept related to the integration of a technological innovation in municipal digital infrastructure;
- Testing and ensuring the protection of data and cybersecurity in relation to this innovation;
- Assessing means through which cyber-resilience can be integrated into this innovation from the outset (project design phase).

Principal partners: Ville de Montréal (Service des technologies de l'information, Bureau de la résilience, Bureau de la ville intelligente et numérique), Smart Cybersecurity Network (Serene Risc)/Université de Montréal, and other partners to be determined.

Time horizon: medium term



ORIENTATION 3

TAKE ACTION TO SUSTAIN A DIVERSIFIED AND INNOVATIVE ECONOMY

In spite of the rapid growth of Montréal's economy in the past few years, the municipal administration faces a number of socioeconomic challenges. Slower demographic growth, the aging of the city's population, labour force requalification needs arising from massive retirement departures – all constitute disruptive elements of our economy with the potential to cause crises. Also important to consider is that our economy is undergoing rapid changes, including the loss of manufacturing jobs to emerging countries such as China and India. To sustain a resilient economy, Montréal will be required to attract foreign talent and give new immigrants professional recognition and the living conditions required to properly integrate them into the community and retain them over the long term.

Montréal will also be required to foster a greater state of preparedness for various disturbances among its companies. According to a study by Gartner Inc. and the University of Wisconsin cited in the *Guide en gestion de la continuité des activités du Québec* in 2010, 43% of North American companies confronted with a major crisis never re-open, while 29% of the remaining companies cease their activities within two years. The more generalized adoption of continuity plans for Montréal companies thus constitutes an important step towards greater economic resilience. In the event of a disaster, the municipal administration must also do its part for companies across the city to ensure the rapid and efficient recovery of business establishments.

Moreover, the movement of people and goods, whose effectiveness is an essential condition for the productivity of the economy as a whole, also represents a major issue for Montréal, due to its insular reality and the aging of its transportation infrastructures. That said, the transportation sector is undergoing profound change, with the continued development of the public transit network, the accelerated growth of active transportation (cycling, walking), the implementation of bike and car sharing systems, and so forth. The municipal administration must be inventive about ensuring the proper integration of new modes of transit that are effective and adapted to the needs of its broader community.

OBJECTIVE A

Promote a good state of preparedness among companies and business establishments in order to deal with disturbances

Montréal-based companies are the engines of our economy, from small and medium-sized enterprises (SMEs) and self-employed workers to major multinational corporations, social economy enterprises and non-profit organizations (NPOs). All have a vital role to play in creating jobs and ensuring the vitality of Montréal's social and economic development. Some companies manage essential infrastructures (energy, telecommunications, food production, etc.), while others produce goods and services that are important to Montrealers, but also to supply chains. Others still offer public gathering and entertainment spaces or act as powerful vectors of innovation in their respective sectors.

When a disturbance occurs, a company's activities are often disrupted. If not enough is done to take preventive action, an entire sector, and even the city's economic diversity, can be affected over the longer term. The situation is particularly dire among SMEs, which account for a significant part of Québec's economic fabric: in 2013, 70% of business establishments surveyed in the agglomeration of Montréal had fewer than 10 employees, according to the Statistics Canada Business Register. In contrast to large multinationals, SMEs often don't have the human and financial resources to adequately develop their response capacity, yet they still face numerous potential disturbances: major power outage, cyberattack, fire, flooding, etc.

In Montréal, the floods in the spring of 2017 affected some 40 retail businesses, mainly in the borough of Pierrefonds-Roxboro. Some SMEs suffered major material damages, while others saw a considerable drop in sales. The municipal administration thus quickly established an emergency response plan for commercial establishments.

ACTIONS

16 Promote joint business continuity initiatives with medium-sized companies in Montréal

To better prepare companies to deal with various potential disturbances, the Bureau de la résilience, in close collaboration with the Service du développement économique and the PME Montréal network, has proposed that business leaders and business continuity stakeholders gather in the city in 2018 to devise an action plan aimed at:

- Raising awareness of the importance of business continuity among medium-sized companies (companies with 100 to 499 employees) across the city;
- Disseminate to these companies the revised version of the Guide en gestion de la continuité des activités pour les entreprises québécoises, published by the ministère de l'Économie, de la Science et de l'Innovation du Québec, and their online tools;
- Support the development of targeted training for business owners and managers.

Principal partners: Ville de Montréal (Service du développement économique/PME Montréal, Bureau de la résilience), Ministère de l'Économie, de la Science et de l'Innovation du Québec, École des entrepreneurs de Montréal, RECO-Québec, Chamber of Commerce of Metropolitan Montréal.

Time horizon: medium term

17 Adopt a planning process for the recovery of retail stores and business establishments

Despite the establishment of business continuity measures by companies, some remain more at risk than others in the event of a disaster. Among small to medium-sized enterprises (SMEs) that occupy places of business, there is often a lack of knowledge of these risks with a corresponding shortage of resources for preventing them. In this context, the municipal administration has a role to play in supporting local businesses so that they can quickly resume their activities in the wake of a disaster.

The Bureau de la résilience, in collaboration with the Service du développement économique, the Direction de la sécurité civile et de la résilience (business continuity) and the Service de l'environnement (food inspection, industrial waste control), will initiate a planning process aimed at ensuring the recovery of businesses and establishments in the event of a disaster. This process will make it possible to:

- Create a cross-disciplinary committee to set action priorities;
- Propose a review of the financial framework legislation so as to create an emergency fund for businesses affected by an emergency situation;
- Support steps undertaken by the Ministère de l'Économie, de la Science et de l'Innovation to ensure a coordinated response meant to facilitate a rapid return to business activities.

Principal partners: Ville de Montréal (Bureau de la résilience, Service du développement économique, Direction de la sécurité civile et de la résilience, Service de l'environnement), ministère de l'Économie, de la Science et de l'Innovation.

Time horizon: short term

OBJECTIVE B

Ensure the effective and secure movement of people and goods

The movement of people and goods across the island of Montréal is an indissociable component of the city economic vitality. In addition, means of transportation structure the city's development, and access to them determines the quality of life of citizens. With the dubious distinction of being the most congested city in Canada (38th in the world and first in Canada, according to INRIX 2017 Global Traffic Scorecard), Montréal faces some daunting challenges, and the presence of multiple levels of governance does nothing to simplify the management of traffic congestion.

The effective and safe movement of people across Montréal is connected to the performance of its transportation network (road, public transit, rail, air). As a North American leader when it comes to the modal share of active transportation and public transit (47% in 2008), Montréal relies on various heavy modes (commuter train, metro, SLR project) to ensure a resilient service, particularly in relation to climate constraints. However, aging facilities and equipment, coupled with growing demand and the evolution of transportation habits, require continued investments to effectively and safely meet users' needs and expectations. Montréal and its partners have thus taken steps to offer multiple means of transportation to Montrealers as well as ensure their modernization (electrification, geolocation, surveillance cameras, etc.). In Montréal, a city spanning an area of close to 500 km², the frequency of passage, equitable service, and improved access to specific neighbourhoods are among the issues specific to public transit network. The municipal administration is taking into account these challenges in an effort to ensure the adequate movement of the entire population of the island.

The Port of Montréal plays a central role in the movement of goods, in tandem with various actors in rail, road, maritime and air transportation, thereby providing national and international connections. The resulting exchanges require well honed logistics resistant to disturbances and constraints, including extreme climate events, road congestion and the multiplication of worksites. In addition, the growing

transportation of hydrocarbons and other dangerous goods by road, pipeline and rail poses safety and economic development challenges. This issue was highlighted in dramatic fashion during the Lac-Mégantic disaster of 2013. Finally, the transportation sector as a whole is currently undergoing major technological changes (smart mobility, self-driving or electric vehicles) that are ushering in a paradigm shift that holds immense potential, but is also fraught with risks associated with the destabilization of existing economic activities.

ACTIONS

18 Develop smart mobility solutions for daily use and emergencies

The Centre de gestion de la mobilité urbaine (CGMU) is a real-time decision-making centre created to facilitate mobility among citizens. Specialized equipment (cameras, “candlestick” priority traffic signals, variable message displays, etc.) allows the city to manage traffic on the road network remotely and react quickly when an incident occurs. For example, the CGMU ensures more effective coordination during festivals or large-scale events, and improved management of traffic in the vicinity of major work projects. The CGMU receives and issues information, notably concerning:

- Real-time traffic signal management
- Increased surveillance of the road network and infrastructures;
- Timely information-sharing with partners, notably the Service de sécurité incendie de Montréal, the Société de transport de Montréal, the Ministère des Transports, de la Mobilité durable et de l'Électrification des transports, and the Centre de sécurité civile.

From this perspective, the CGMU, through the use of these digital solutions, also aims to:

- Optimize the movement of emergency services in emergency situations;
- Facilitate the dissemination of messages to pedestrians and motorists during large-scale events;
- Facilitate and guide pedestrian and vehicle traffic during the evacuation of a specific sector.

Principal partners: Ville de Montréal (Service des infrastructures, de la voirie et du transport, Centre de sécurité civile, Bureau de la résilience).

Time horizon: in progress

19 Develop a knowledge of logistics chains in Montréal and the risks associated with their interruption

The Port of Montréal is an important economic engine for the city, but also for Québec as a whole and for Canada. Taking their cue from the cities of Rotterdam and Norfolk, staff at the city's Bureau de la résilience highlighted the importance of a partnership with the Montréal port authority administration.

In order to foster greater knowledge of logistics chains operating across the city and to heighten awareness among stakeholders in critical economic sectors that could be affected by a disruption, the Bureau de la résilience will collaborate with the Port of Montréal to step up research and further develop its knowledge of the subject. The Bureau will also collaborate with key actors in order to:

- Determine the economic impact exerted by the port of Montréal;
- Target the economic sectors and enterprises that are most vulnerable to potential disruptions;
- Assess the impacts on Montréal's population.

Principal partners: Montréal port authority, Ville de Montréal (Bureau de la résilience)

Time horizon: medium term

20 Develop a method for analyzing risks associated with the transportation by rail of dangerous goods across the city

The risk of an accident involving the transportation of dangerous goods has become a subject of broad public concern, particularly since the Lac-Mégantic disaster in July 2013. As well provoke a reassessment by authorities and risk management specialists, the Lac-Mégantic disaster changed public perceptions of rail and industrial risk. The event also led to the adoption of Protective Direction 32, which was replaced by the federal government's Protective Direction 36 requiring that rail companies share information on the type and volume of dangerous goods transported within the limits of a municipality. These data are used to plan emergency measures and responses.

The Centre de sécurité civile is currently working to develop a method for analyzing the risks associated with the transportation of dangerous goods by rail. The Center will determine the:

- Probability of the presence of a source;
- Probability of exposure;
- Vulnerability to impacts.

Principal partners: Ville de Montréal (Centre de sécurité civile, Bureau de la résilience), and other partners to be determined.

Time horizon: long term

Montréal in action: Building and operating sustainable and resilient public transit buildings and infrastructures

Under its new Sustainable Development Plan, the Société de transport de Montréal (STM) has erred in favour of actions that will make it possible to build and operate sustainable and resilient buildings and infrastructures (Priority 2)

Out of a concern with building quality facilities, reducing its environmental footprint and optimizing the benefits for local communities, the STM has made a commitment to target sustainable development certifications for its buildings in large infrastructure projects. Given the risks associated with climate change, notably heavy rains, flooding, heat waves and destructive storms, the STM is taking various measures to mitigate vulnerability across its network, ensure user safety, and maintain services in the event of extreme weather. In order to curb heat island effects, the STM, where possible, is integrating greening measures into its construction or renovation projects.

Inspiration: Sweden/Vision Zero

Since 1997, the Vision Zero approach has proven its worth on the road network in Sweden. Starting from the principal that no one should perish or sustain serious injury when travelling the streets, Vision Zero suggests actions across a range of components of the road traffic system in order to guarantee the safety of all road users: pedestrians, cyclists, drivers and passengers of all ages and under all conditions. Various dimensions must be taken into consideration, all of which demand the attention of the parties concerned. These include the planning, design and management of infrastructures, regulatory provisions, surveillance and control tools, technological innovations, and education and awareness initiatives.

Why is Montréal adopting Vision Zero? With a very positive road safety record compared to other large cities around the world, Montréal has chosen to further prioritize human life by adopting this effective road strategy across the city.

The measures put forward since the adoption of the Plan de transport in 2008 have made it possible to reduce fatal accidents and serious injuries by more than 50%. The Vision Zero deaths and injuries approach is a continuation of that initial thrust. What's more, Montréal stands apart by virtue of its growing share of bicycle and pedestrian transportation, which is why the municipal administration is bringing a special focus to bear on vulnerable users, such as pedestrians and cyclists.

OBJECTIVE C

Anticipate socioeconomic challenges and capitalize on knowledge and creativity assets

The relative state of poverty affecting the broader Montréal community already exerts pressure on the city's resilience. Current trends point to renewed challenges in this regard, with demographic forecasts indicating that regional population growth will slow between now and 2031, even as the aging of the population continues. These trends have led to difficulties related to labour force adaptation and the distribution of wealth, which are evidenced concretely in increased numbers of disadvantaged groups: the homeless, people living alone, single-parent families, workers paid below the low income cut-off, and so on. The effects of this phenomenon are felt, in particular, across Montréal's specialized services, including in mental health hospitals, adapted care and transportation services, and in organizations for people with functional limitations. The offer of specialized services not yet available in other Québec regions has served to concentrate populations with special needs in the city and is likely to affect the city's capacity to deal with a shock.

Moreover, Montréal is home to the largest population of international immigrants in Québec, and the city welcomes the majority of new immigrants. In 2016, some 38,000 permanent residents and more than 70,000 temporary residents arrived in Montréal. This population influx has radically transformed Montréal's landscape and economy. In 2015 and 2016, the municipal administration played a vital role in receiving Syrian refugees across the city, in collaboration with numerous social and community groups. This situation highlighted the needs on the ground and prompted the creation of the Bureau d'intégration des nouveaux arrivants de Montréal in 2016. However, the improved integration of immigrants, particularly into the workforce, remains a priority concern for the economic development of the city.

ACTIONS

21 Promote the resilient and sustainable development of Montréal's economy

Montréal has a diversified economy, a skilled and multilingual workforce, a social climate and quality of life that are favourable to investment, and high-calibre university infrastructures.

In order to maintain and capitalize on these assets, the municipal administration must develop the economy's adaptation capacity to deal with current and emerging challenges, including:

- The aging of the city's population and infrastructures;
- The integration of immigrants and visible minorities into the job market;
- The transition towards new and more sustainable economic models (sharing economy, circular economy, etc.);
- School perseverance;
- Training-employment matching;
- The retention of international students.

In order to achieve these objectives, the Bureau de la résilience, in collaboration with its partners, wishes to hold a series of conferences on these issues so as to:

- Present the notion of economic resilience as well as the resilience indicators and factors that contribute to it in Montréal, as well as the social, economic and environmental challenges that lie ahead;
- Promote best local and international practices, notably in connection with work carried out by the post-industrial cities committee in the city of Glasgow (100 Resilient Cities network);
- Support and publicize proactive actions undertaken by the city and its partners in this area.

Principal partners: Ville de Montréal (Bureau de la résilience, Service du développement économique, Bureau du développement durable), Techno Montréal and other potential partners, including the Chamber of Commerce of Metropolitan Montréal.

Time horizon: long term

Montréal in action: Integrating immigrants into the job market

The *Intégration-Travail-Formation (Integration-Work-Training)* pilot project is an initiative of the city's Bureau d'intégration des nouveaux arrivants à Montréal (BINAM), implemented in collaboration with the Government of Québec and the Chamber of Commerce of Metropolitan Montréal (CCMM). Thus far, as part of this project, four large Montréal-based companies have made a commitment to offer temporary paid work to qualified immigrants in Montréal for a significant period and to offer them individualized integration and training. This project's general objective is to accelerate the integration of qualified new immigrants into positions that meet their level of qualification and skills.

Specific objectives of the initiative:

- Offer significant work experience in a large company to a cohort of 12 to 15 newly arrived, qualified workers, with up to 52 weeks of work;
- Implement a professional mentorship program within companies;
- Offer refresher training to meet the specific needs of each participant.

Added value for participating companies:

- Access to wage subsidies from Services Québec, up to the minimum wage (a first for large employers);
- Promotion of positions in multiple vast networks (Ville de Montréal, CCMM, employment agencies, etc.);
- Financial support from Services Québec for refresher training;
- Training in communications and intercultural management offered by the city.





ORIENTATION 4

TAKE ACTION TO PROMOTE INTEGRATED GOVERNANCE IN THE SERVICE OF THE COMMUNITY

Managing major disturbances across the city is always likely to involve multiple authorities. Vulnerabilities that can affect the exercise of leadership and the effectiveness of actions taken daily or in emergency situations may include cumbersome administration, complex structures, the difficulty of establishing cross-sectoral channels of communication, and the lack of a shared risk management culture.

Events such as the major snowstorm and the floods in early 2017 highlighted the need to review our preparation for catastrophes and the coordination of the various actors and authorities concerned.

Over and above the importance of ensuring the availability of means and resources and the community's state of preparedness, an integrated governance structure is a must. That governance structure should favour an exhaustive knowledge, anticipation and sharing of risks, and a quality coordinated response by various actors to disturbances likely to affect the living conditions and safety of citizens. Elements that are key to building a city's resilience include clear decision-making processes, effective collaboration, interactive communication and increased coordination between various stakeholders.

In order to address issues related to the coordination of organizations involved in public safety, action must be taken on several levels. Horizontal integration must be established to promote improved coordination between municipal departments, establish working ties between various stakeholders across the city, and draw on lessons learned in the wake of a disaster. Additionally, efforts must be made to better organize vertical integration internally – between central services, the boroughs and the broader community – and externally, with other levels of public administration (federal, provincial and regional).

OBJECTIVE A

Ensure the city's adequate state of preparedness in relation to natural and anthropogenic risks

In addition to the risk posed by extreme weather events, Montréal faces a number of technological, biological and social risks. In collaboration with its partners, the municipal administration must prepare accordingly, be it for a terrorist threat, an industrial accident or a pandemic.

To ensure its proper preparation, the municipal administration is being proactive about knowing the risks, training, planning, and staging preparation exercises. As part of the implementation of its strategy, several activities will be developed to ensure that the city is adequately prepared and to anticipate and be aware of the increased risks in connection with vulnerabilities, impacts and hazards. This state of preparedness is reviewed annually using indicators to prioritize responses.

Above and beyond proper preparation for purposes of anticipating an emergency response, the city must develop and increase its learning capacity subsequent to a shock so that it can better target future responses and the necessary prevention and mitigation activities. The municipal administration is establishing mechanisms to protect its citizens, companies and ecosystems, and continue to offer services in the event of a major event.

To ensure the resumption of critical activities and services should they be affected by an emergency situation, the city established a business continuity program in 2016 aimed primarily at analyzing vulnerabilities and prioritizing its activities and services. Its goal is to identify critical activities and services and the maximum acceptable interruption thereof. Business continuity plans will then be developed for the activities and services most susceptible to interruption.

ACTIONS

22 Assess the agglomeration of Montréal's state of preparedness and train municipal employees

Each year, the Centre de sécurité civile reports on the agglomeration of Montréal's state of preparedness for a disaster. The report is based on a set of indicators, which will be reviewed. Indeed, indicators of resilience and business continuity will be added in order to provide a more complete picture of the agglomeration's state of preparedness. Steps were taken to:

- Develop assessment indicators;
- Prepare and disseminate the assessment questionnaire;
- Compile results and produce an annual report.

After more than 800 hours of training spanning three years, meant to allow all municipal employees to become more aware of risks and the importance of the state of preparedness, the municipal administration developed an initial online training course. This first step will make it possible, over the longer term, to offer multiple training courses to the city's 28,000 employees and eventually the entire population of Montréal. Steps were taken to:

- Acquire an online software application;
- Develop online training;
- Disseminate the training on the city's platforms.

Principal partners: Ville de Montréal (Centre de sécurité civile, Service des technologies de l'information, Bureau de la résilience).

Time horizon: medium term

23 Promote business continuity at the city

With the goal of integrating business continuity into its strategic planning and its operational and organizational culture, the municipal administration took steps, in 2016, to create a business continuity program. By drawing on standards in the field and collaborating with the concerned departments, the Direction de la sécurité civile et de la résilience adapted a business continuity methodology to the city's operational realities.

The implementation of business continuity will include the following steps:

- Adoption of a continuity policy;
- Development of initial continuity plans for the first five participating departments;
- Development of the first continuity plans for four boroughs;
- Expansion of the program to other municipal departments and boroughs.

Principal partners: Ville de Montréal (Direction de la sécurité civile et de la résilience, Service des technologies de l'information, Service de l'eau, Service de sécurité incendie de Montréal, Service de police de la Ville de Montréal, Service des ressources humaines/division de la paie, the boroughs of Verdun, Plateau Mont-Royal, Rivière-des-Prairies–Pointe-aux-Trembles, and Montréal-Nord)

Time horizon: long term

24 Produce an index of socioeconomic vulnerability in Montréal

An index of socioeconomic vulnerability assesses and classifies a community's vulnerability to catastrophes, specifically as it relates to its capacity to mitigate and adapt to various types of environmental and anthropogenic shocks. Analyzing spatial distribution on the social vulnerability index makes it possible to target priority sectors for prevention and action on a day-to-day basis and during major disasters.

The Bureau de la résilience will collaborate with the Centre de sécurité civile and 100 Resilient Cities to develop a socioeconomic vulnerability index using statistical methods and analyzing spatial distribution in relation to the index. Major steps in the project will consist of:

- Identifying the climate hazards required for the index;
- Identifying vulnerability indicators;
- Compiling statistical data;
- Producing a statistical analysis of vulnerability indicators;
- Mapping the results.

The results of this analysis will be used for several projects, including a project to draw up a risk overview for Montréal, and another project to identify priority sectors for response, prevention and risk awareness.

Principal partners: Ville de Montréal (Bureau de la résilience), Aecom, 100 Resilient Cities.

Time horizon: in progress

25 Produce an overview of potential risks across the city

The Centre de sécurité civile and the Bureau de la résilience will begin the process of establishing a risk overview for Montréal. In order to do so, an analysis of vulnerabilities, hazards and their potential impacts, with the elements categorized so as to prioritize the required response and mitigation measures. These efforts will be aimed chiefly at mitigating the impacts and vulnerabilities specific to Montréal's population and its infrastructures. The implementation steps will consist of:

- Updating data on hazards that could affect Montréal;
- Producing an analysis of the impacts specific to the hazards identified;
- Assessing vulnerabilities across the city;
- Producing an analysis and an overview of risks in Montréal.

Once the risk overview is updated, the Centre de sécurité civile and the Bureau de la résilience will:

- Update or develop emergency response plans for priority risks;
- Assess mitigation measures that could reduce impacts;
- Establish programs to reduce vulnerabilities across the city.

Principal partners: Ville de Montréal (Centre de sécurité civile, Bureau de la résilience), and other partners to be determined.

Time horizon: long term

26 Establish multi-risk monitoring in Montréal

City departments have access to monitoring, assessment and analysis mechanisms to track and detect problem situations or anticipate events that could affect part of the population. Current monitoring efforts are spread out across several structures within the municipal organization. The Direction de la sécurité civile et de la résilience intends to create a multi-risk monitoring centre mandated to anticipate events more quickly and effectively, mobilize the concerned actors, and collate all monitoring data. This centre will make it possible to gain a comprehensive and accurate picture of situations presenting minor impacts with the potential to become major impacts.

Major steps in the project:

- Research and assess systems and procedures used in Canada and globally;
- Form a committee with the relevant actors in order to identify the most effective mechanisms for Montréal for purposes of listing, validating, sharing and following up on this information;
- Develop a working and exchange method with centres of expertise for the various risks with the objective of consolidating forecast capacity for the benefit of decision-makers and the population;
- Identify notification methods for each type of alert or warning, based on a target population and the adequacy of tools principle;
- Develop a mobilization protocol for stakeholders with civil security organizations within the agglomeration of Montréal.

A Bureau de la résilience pilot project is already underway, and its objective is to develop a dashboard for meteorological risks. This software application will serve to track forecasts and probable impact thresholds online, and issue alerts to emergency responders.

Principal partners: Ville de Montréal (Bureau de la résilience, Centre de sécurité civile, Ville intelligente et numérique, Service des technologies de l'information, Centre de gestion de la mobilité urbaine, Service de police de la Ville de Montréal, Service de sécurité incendie de Montréal, Service de l'environnement), Direction de la santé publique, Environment and Climate Change Canada, Wood, 100 Resilient Cities, citizens, and others to be determined.

Time horizon: medium term

OBJECTIVE B

Collaborate and share expertise in order to promote informed decision-making

Crisis situations require timely decision-making based on the information available at the time with the objective of ensuring public protection. But proper prevention and planning, ahead of time, make it possible to better manage situations and provide effective coordination under emergency circumstances.

Chronic and major urban issues, such as road congestion and homelessness, also require decision-making based on targeted analysis, together with planning and collaborative work to determine the proper action strategies. In the short term, the choices made and the actions implemented by authorities and their partners thus exert an impact on the safety of citizens, while in the long term, they exert an impact on their quality of life.

Additionally, these decisions must draw on scientific, professional and technical knowledge. The municipal administration, owing to its proximity to citizens and its responsibilities as a manager of living environments, has a key role to play in these decisions. In this context, the city must continue to develop a comprehensive municipal planning approach and improve collaboration between departments ahead of disruptive events, with the goal of taking joint action with other public authorities and key partners. This joint planning must respect the jurisdictions of each and place citizens at the heart of the decision-making process.

The municipal administration, moreover, must continue to promote its capacity for feedback and knowledge transfer in relation to disruptive events, and it must be able to detect vulnerabilities in existing coordination processes for purposes of improving the way it operates.

ACTIONS

27 Consolidate the Bureau de la résilience's mission and systematize collaboration and resilient solutions

In order to implement a comprehensive and consistent vision of resilience in Montréal, the Bureau de la résilience is playing an active part in consultations with municipal and paramunicipal departments. In the short term, the Bureau de la résilience will collaborate on the development of:

- The second action plan put forward by the Bureau de la ville intelligente et numérique;
- The action plan put forward under the Social Development Policy issued by the Service de la diversité sociale et des sports;
- The review of the agglomeration of Montréal's Civil Security Policy;
- Research and development projects put forward by the Service des technologies de l'information.

Moreover, to ensure the effective collaboration between various municipal departments and other levels of government, as well as the sharing of expertise on current and future files, the Bureau de la résilience will establish three new cross-disciplinary committees in the following areas:

- Planning methods, standards and rules for resilient construction and green infrastructures;
- Planning the recovery of retail stores and business establishments;
- Adaptation of critical infrastructures to climate change.

Principal partners: Ville de Montréal (Bureau de la résilience, Service de la mise en valeur du territoire, Service de l'environnement, Service du développement économique, Service de l'eau, Service des infrastructures, de la voirie et des transports, Bureau de la ville intelligente et numérique, Service de la diversité sociale et des sports), and other external partners.

Time horizon: medium term

28 Develop resilience indicators

To measure the progress of resilience in Montréal, the Bureau de la résilience has given itself a mandate to develop indicators of resilience on two levels: overall indicators for the agglomeration of Montréal, and specific indicators for each action set out in Montréal's Resilient City Strategy.

The indicators will be developed in part using the City Resilience index (CRI), a tool provided by 100 Resilient Cities and Arup. The CRI tool is intended to help cities in the network understand and measure resilience in a systematic manner applicable on a global scale. Designed as a self-evaluation, the online CRI tool generates a resilience profile detailing a city's specific strengths and weaknesses, by creating a basis upon which to plan and measure future progress. In order to complete the CRI, the Bureau de la résilience will

- collect the statistical data required for the CRI;
- Produce a data analysis and analyze the results;
- Disseminate specific indicators and results in the report on the agglomeration's state of preparedness..

In a second phase meant to ensure follow-up and measure the effectiveness of actions undertaken as part of the strategy, performance indicators will be developed with the concerned partners. This follow-up and assessment will make it possible to make adjustments during the review of the action plan.

Principle partners: Ville de Montréal (Bureau de la résilience), 100 Resilient Cities, Arup, and other partners.

Time horizon: in progress

29 Further develop and share knowledge about urban resilience

The municipal administration is committed to sharing knowledge gained from the 100 Resilient Cities program and the development and implementation of Montréal's Resilient City Strategy. The Bureau de la résilience will thus take part in symposiums and conferences, sit on committees, work with professional associations, and draft articles. As well, the Bureau de la résilience will:

- Participate in the Cité-ID LivingLab Gouvernance de la résilience urbaine established by the École nationale d'administration publique (Énap);
- Maintain ties with cities in the 100 Resilient Cities network, specifically with the three participating Canadian cities (Calgary, Vancouver and Toronto) so as to ensure effective sharing of emerging best practices in resilience;
- Participate in the network of large Canadian cities involved in emergency preparedness.

Principal partners: Calgary, Toronto, Vancouver, Halifax, Winnipeg, Edmonton, Regina, Ottawa, Saskatoon, École nationale d'administration publique

Time horizon: in progress

Montréal in action: Event report and feedback – 2017 floods: Making Montréal a community that's resilient to flooding

The city's Direction de la sécurité civile et de la résilience produced a report with recommendations, summarizing the main observations and lessons learned during the response in the spring of 2017. This report was issued in the wake of a feedback session held in June 2017, and its goal was to make the agglomeration of Montréal more resilient to flooding by improving the state of preparedness of responders and fostering more extensive knowledge of risk at the city.

The main recommendations issued in this report concern the following main objectives:

- Improve our knowledge of risk and the potential impacts in order to establish mitigation measures;

- Improve the state of preparedness of various responders in case of flooding;
- Improve coordination between responders;
- Improve communication with disaster victims, vulnerable people and the population in general, by reviewing the communications plan and the tools used to deal with flooding;
- Improve support to employees of the agglomeration of Montréal through the development of workforce succession plans between boroughs/reconstituted cities in conjunction with emergency measures;
- Improve the state of preparedness of corporate citizens in the agglomeration so as to optimize the recovery of retail stores and business establishments.

OBJECTIVE C

Establish interactive communications between authorities and the public so as to disseminate information daily and alert citizens in the event of a disaster

Montréal is home to people from 120 countries, and those people speak close to 200 languages. This reality lies behind one of the leading challenges facing Montréal: communicating with citizens on a daily basis and in emergency situations. Communication platforms are evermore diversified, amid a rapidly changing media landscape where information is shared in real time. Citizens expect to receive information instantaneously, particularly during a major event. The city must rethink its communication strategy and modernize and adapt the tools at its disposal so as to meet Montrealers' expectations on a day-to-day basis and in emergency situations.

In addition to dissemination tools and means, the municipal administration must review the content and format of the messages it issues to prepare citizens for catastrophes. These messages do not seem to be reaching their target: often, the majority of Montrealers never hear them, or the message is misunderstood. The promotion of the 72-hour kit is the most striking example of this communications failure: all levels of government have used this prevention message for several years, yet the percentage of Montrealers who read it and prepared the kit remains very low.

ACTIONS

30 Rethink the risks communication to citizens

AWARENESS MESSAGES

The Bureau de la résilience and the Centre de sécurité civile have an objective to review messages and risk awareness tools geared to citizens in order to inform them about their role and their required state of preparedness. In this context, the Bureau de la résilience teamed up with the Université de Montréal and the Ministère de la Sécurité publique with the goal of enhancing the scope of this project and the results.

This research project has two main objectives:

- Define a range of complementary and adapted awareness tools;
- Develop a strategy to disseminate these awareness tools.

Major steps in the implementation of the project:

- Draw up a picture of the perception of risk among citizens using interviews and online surveys;
- Define the set of communications tools with discussion groups made up of citizens and experts;
- Produce an implementation feasibility study for the new communications tools and develop a dissemination strategy.

MEANS OF COMMUNICATION

New communications technologies can be used to improve the dissemination of data on risks and alerts to the public in the event of disasters. These technologies must be used more effectively by responders to ensure that a good state of preparedness exists among Montrealers. Improved new tools are under development at the municipal level:

- Notices and Alerts service;
- Open data portal;
- Community alert service;
- Alert sirens in case of a toxic spill.

As well, starting in April 2018, federal and provincial authorities, in case of imminent danger, will be able to use the *Québec en alerte* system to issue a sound alert broadcast simultaneously on the smart phones of all people in a given sector. A bilingual banner with a short message will appear on the device screen and a specific vibration will be triggered.

The Centre de sécurité civile will ensure the interface between the communications systems and those used by other levels of government in order to issue timely alerts to the population of Montréal more effectively.

Principal partners: Ville de Montréal (Bureau de la résilience, Centre de sécurité civile, Services des communications), ministère de la Sécurité publique du Québec, Université de Montréal, and other partners.

Time horizon: in progress

Montréal in action: Urban displays of preventive notices and emergency alerts

Digital display terminals are an increasingly familiar sight in Montréal. These technological tools can serve to complement traditional tools in emergency situations and quickly reach a large number of Montrealers in the four corners of the city. The Centre de gestion de la mobilité urbaine and the Direction de la sécurité civile et de la résilience are in the process of negotiating an agreement pertaining to their use.

The telecommunications giant, Bell Canada, a long-standing civil security partner in Montréal, is also initiating a pilot project in this area. The company expects to transform and update its old telephone booths across the city. As part of Montréal à pied, a project put forward by Faire Montréal, Bell will retrofit its urban furniture by integrating WiFi, a smart phone charging station, an LTE terminal, and integrated cameras. In addition, the company intends to offer civil security authorities the option of changing the announcements on these display screens for purposes of posting notices to citizens in emergency situations (e.g., active shooter, AMBER alerts, boil water advisories, etc.). An initial pilot project is underway on Nun's Island.

IMPLEMENTATION



To help build an alert and proactive community and better anticipate and collectively adapt to growing social, economic and environmental challenges, Montréal's Resilient City Strategy is supported by a concrete five-year action plan that calls for an interim report to be issued in 2020. This assessment will provide an opportunity to make adjustments and improvements, where required.

Once the strategy is tabled, follow-up and assessment indicators will be developed to produce the interim report and assess the actions implemented. The Bureau de la résilience will collect data on these indicators, in collaboration with partners of Montréal's Resilient City Strategy as well as municipal departments and boroughs.

The 100 Resilient Cities network will support the work of the Bureau de la résilience in this area, using the City Resilience Index (CRI) developed by ARUP. This index was developed specifically to measure and assess urban resilience over an extended period of time. It embodies a comprehensive vision of the city structured around four major categories, 12 objectives, and 52 indicators. The CRI was not devised to compare different cities in the 100 Resilient Cities network, but it can serve as a common basis of measurement to facilitate the sharing of best practices.

An action plan follow-up committee will be tasked with observing the implementation. This committee will be made up of representatives of the city as well as Montréal-based stakeholders specialized in resilience.



LIST OF ORGANIZATIONS THAT PARTICIPATED IN THE DEVELOPMENT OF THE STRATEGY

100 Resilient Cities	Office municipale d'habitation de Montréal (OMHM)
Aecom	Ouranos consortium
Association industrielle de l'Est de Montréal (AIEM)	Plateau Mont-Royal borough
Bell Canada	Polytechnique de Montréal
Brodeur Frenette	RECO-Québec
Bureau de la ville intelligente et numérique	Réseau de transport métropolitain
Bureau d'intégration des nouveaux arrivants à Montréal	Rivière-des-Prairies-Pointe-aux-Trembles borough
Bureau du développement durable	Saint-Laurent borough
Canadian Red Cross	Service du développement économique
Centraide	Service de l'environnement
Chamber of Commerce of Metropolitan Montréal	Service de la diversité sociale et des sports
CIUSSS du centre-Sud-de-l'île-de-Montréal	Service de la mise en valeur du territoire – Direction de l'urbanisme
Concordia University	Service de police de la Ville de Montréal
City of Calgary – Resilient Calgary	Service de sécurité incendie de Montréal – Direction de la prévention et de la planification
City of Toronto – Resilient Toronto	Service de sécurité incendie de Montréal – Direction de la sécurité civile et de la résilience
City of Vancouver – Resilient Vancouver	Service des affaires juridiques
Côte-des-Neiges-Notre-Dame-de-Grâce borough	Service des communications
Direction de la gestion stratégique des réseaux d'eau – Division gestion durable de l'eau	Service des technologies de l'information
Direction des Transports – Division de l'exploitation du réseau artériel	Smart Cybersecurity Network (Serene Risc)
Direction de la santé publique de Montréal	Société d'habitation et de développement de Montréal (SHDM)
École des entrepreneurs de Montréal	Société de transport de Montréal
École nationale d'administration publique	Sud-Ouest borough
Energir (Gaz Métro)	Sun Youth
Environment and Climate Change Canada	Table de concertation des organismes aux services des personnes réfugiées et immigrantes
Groupe uni des éducateurs-naturalistes et professionnels en environnement (GUEPE)	Techno Montréal
Hydro-Québec	Transition NDG
Institut national de santé publique du Québec (INSPQ)	Université de Montréal
Kheops consortium	Université du Québec à Montréal
Major Industrial Accident Reduction Council (MIARC)	Urgences-santé
Maison de l'innovation sociale	Verdun borough
Ministère de l'Économie, de la Science et de l'Innovation du Québec	Ville de Montréal-Est
Montréal-Nord borough	Wood extreme weather forecasting
Montréal Port Authority	

The city's Bureau de la résilience wishes to thank all the individuals who were involved directly or indirectly in the development of Montréal's Resilient City Strategy.





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