NUMANA

EMPATHIC NEIGHBOURHOODS

A FUTURE WHERE TECHNOLOGY, WELL-BEING AND RESILIENCE MEET

SUMMARY

Smart cities have introduced technological solutions to urban challenges, but they have also revealed limitations, notably by exacerbating inequalities and raising concerns about privacy. To remedy this, the concept of empathic neighbourhoods proposes a human-centered approach. By integrating technologies in an ethical way, these neighbourhoods aim to promote inclusivity, resilience and community well-being. Empathic neighbourhoods foster inclusion and social cohesion, enabling communities to strengthen their local agency in the face of global threats, while improving their quality of life.

These neighbourhoods offer the opportunity to integrate what can be called “caring” or “benevolent” technologies into the heart of urban life. Designed to be ethical and inclusive, these technologies meet the real needs of communities while respecting individual privacy. They also enrich everyday life and strengthen social fabric by creating resilient, sustainable environments. Empathic neighbourhoods offer an innovative response to urban challenges, ensuring that technology supports communication, assistance and socialization in a way that is accessible to all, including marginalized groups.

Empathic neighbourhoods are expected to generate significant social and economic benefits for their communities, improving quality of life while reducing public expenditure. By adopting this model, Quebec could position itself as a leader in caring technologies.

Numana is located on the unceded traditional territory of the Kanien'kehá:ka (Mohawk) Nation, in the Tiohtià:ke (Montreal) region, a historic meeting place for many First Nations peoples, including the Kanien'kehá:ka of the Haudenosaunee Confederacy, the Huron-Wendat, the Wabanaki and the Anishinaabeg. We respect the Kanien'kehá:ka as traditional custodians of these lands and waters, and are committed to honouring their history, culture and traditions. With this recognition comes a commitment to respect the principles of OCAP® (Ownership, Control, Access and Possession) in our work with First Nations data and information, recognizing their right to data sovereignty.

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ABOUT US

NUMANA

Numana's mission is to stimulate the development and adoption of cutting-edge technologies to improve the lives of tomorrow's human beings, by bringing together Quebec's driving forces around emerging and disruptive innovations. As a technology ecosystem macro-accelerator, Numana fosters innovation and value creation by building strong links between stakeholders, developing technology ecosystems and collaborating closely with industry leaders.

Numana's aim is to make technological innovation a collective asset, and to increase the impact of technology in meeting societal challenges, while ensuring Quebec's economic and social viability.

Founded in 2007, Numana is a not-for-profit organization that plays an essential role in the Quebec economy. It brings together players from the private, public and institutional sectors to work on joint projects aimed at boosting the development of information and communications technologies (ICT). Numana organizes think tank meetings to discuss emerging ICTs and new business models, produces studies on emerging sectors, submits public policy briefs to governments and shares its knowledge through conferences, panels, webinars and public events.

EMPATHIC NEIGHBOURHOODS THINK TANK

The Empathic Neighbourhoods project came to life in 2020 with the creation of a think thank and the publication of a study on green and intelligent buildings (Numana 2021). In 2023, Numana collaborated with the *Ministère des Relations internationales et de la Francophonie*. (MRIF) to create fact sheets on Quebec's smart city and smart building initiatives. The fact sheets highlighted the importance of technological innovation and sustainable infrastructure in building smart, healthy and resilient cities. They also highlighted the key role of clean technologies in resource management and urban resilience in the face of climate, energy and health challenges. In addition, they illustrated Quebec's advances in green construction, including the adoption of green and intelligent building (GIB) and solid wood, as well as the integration of artificial intelligence (AI) solutions to optimize urban infrastructure. This subject gained further visibility at Humanitek 2023, where Carlo Ratti, Director of the Senseable Lab at the Massachusetts Institute of Technology (MIT), gave a lecture on designing empathic, sustainable cities using digital technologies.

It was through these projects that Numana became aware of the need for a more empathic approach to the use of technologies for cities and urban planning. The following question emerged:

"**Beyond simple urban management, how can technologies be used to improve the well-being of residents?**"
This question led to several others, such as:

- Can technological solutions be implemented to combat social isolation and promote human interaction and environmental resilience within neighbourhoods?
- What are the minimum standards that technologies must meet in order to contribute to an empathic neighbourhood?
- What kind of governance needs to be put in place for us to be able to speak of an "empathic" neighbourhood?
- How can we ensure that technologies are accepted by local residents and that their use is sustainable?

Quebec already boasts an entrepreneurial ecosystem in benevolent technologies (Tech for Good). Numana sees the potential to play a crucial role in the development of an economic sector centered on this type of technology, and to position Quebec as a hub for benevolent technologies.

In assembling the think thank members Numana was keen to begin assessing the potential of technologies under this new approach. The think thank was intentionally constituted to represent a diversity of professional experience, opinions and interests. It was therefore composed of representatives from technology companies, paramunicipal institutions, research centers, universities and the sectors of health, urban planning, architecture, sustainable mobility, environmental and building engineering, education, the arts, foresight, ethnology, AI and technology.

From January to June 2024, Numana's 13-strong Empathic Neighbourhoods think thank[1] took on the task of analyzing

1. Particular attention has been paid to ensuring truly inclusive representation, ensuring gender balance, a diversity of expertise from multiple sectors, varied life experiences, as well as diverse ethnic backgrounds, to reflect the plurality of perspectives.

the impacts and opportunities associated with the empathic neighbourhood concept. The initial definition of an empathic neighbourhood was «a set of technological and social innovations used in a benevolent and empathic way to enhance the socialization, autonomy and resilience of people and the environment at the scale of a neighbourhood.» The aim was to discuss the definition and develop a shared - and cross-sectoral - vision of what an empathic neighbourhood should be. The think tank activities included three large-group meetings, seven individual interviews and discussions with ten potential partners, for a cumulative total of 110 hours of individual partner involvement.

This study reflects the diversity of viewpoints expressed and proposes a common vision for Quebec. It sets out steps and recommendations to make the concept a reality and integrate it into future land-use planning projects.

Members of the think thank

1. Adèle Salin-Cantegrel, Ph.D., CEO of Scikoop; Vice-President of the Coalition de parents d'enfants à besoins particuliers du Québec (CPEBPQ).
2. Gaétan Brousseau, engineer; Founder and CEO of Innovention Inc.
3. Nathalie Boucher, Ph.D., Urban Studies, specialist in urban public spaces, Director of R.Es.P.I.R.E.
4. Joel Trudeau, professor at Dawson College; AI project leader for DawsonAI; advisor for AILaunchLab; holder of mixed Anishnabee-Odjibwa heritage
5. Dr. Olivier Beauchet, full professor, Faculty of Medicine, Université de Montréal; geriatrician and neurologist, Institut universitaire de gériatrie de Montréal; clinician-researcher specializing in the effects of the arts on health; Director of the AgeTeq laboratory; co-holder of the CREAT Research Chair.
6. Ursula Eicker, Ph.D., professor, Department of Building, Civil and Environmental Engineering, Concordia University; Director, Canada Excellence Research Chair (CERC) in Smart, Sustainable and Resilient Communities and Cities, and Institute for Next Generation Cities
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8. Kathy Malas, Director of Research, Innovation and Learning, CISSS de la Montérégie-Ouest; associate professor, Department of Entrepreneurship and Innovation, HEC Montréal; member of the *Board of Directors of the Quartier de l'innovation en santé*.
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SCOPE OF THE STUDY

The deployment of smart cities, while offering many opportunities, raises critical issues around ethics, social inclusion and sustainability. Socio-economic inequalities and the digital divide are often exacerbated by projects that privilege certain neighbourhoods, while massive data collection raises concerns about privacy. These initiatives frequently fail to address the real needs of communities, and thus run counter to the United Nations' Sustainable Development Goals (SDGs). Vulnerable populations, such as the elderly or those on low incomes, are particularly affected, leading to social exclusion and a loss of trust in institutions. Finally, **the lack of empathy in the design of urban projects amplifies the distance between those who live in them and those who make decisions, compromising the inclusivity and sustainability** needed to achieve the SDGs.

The issues raised by smart cities call for collective reflection. The negative consequences identified reveal root causes such as a lack of global vision, the prioritization of technology over community needs, and a lack of consultation and participation of community members. Obstacles to solving these problems, such as system complexity, high costs and resistance to change, underline the urgency of adopting a more inclusive and sustainable approach to the

development of technologies for cities.

It was in response to these questions that the idea of “empathic neighbourhoods” was born. Members of Numana’s think tank sought to better define this emerging concept in order to propose a common vision for the whole of Quebec. The empathic neighbourhood approach is one possible response to the issues described above. It aims to create living environments that enable the people who occupy them to feel listened to, valued, connected and engaged. By promoting inclusion, community participation and sustainability, empathic neighbourhoods tend towards an inclusive approach to creating urban spaces.

This study outlines the characteristics empathic neighbourhoods should have, the needs they should meet, the principles that should guide their implementation, and the approaches and governance systems that should accompany them. It also looks at the role that technology can play as a tool for implementing empathic neighbourhoods and deploying them on a daily basis, while anticipating the social and economic impacts that could result.

This study is intended as an initial guide to support the implementation of empathic neighbourhoods, offering guidance to potential living labs and pilot projects. Rather than seeking to create a new concept for the sake of innovation, it aims to identify and explore similar initiatives already in existence to encourage alignment. This document, the result of rich discussions between group members, does not claim to be exhaustive academic research. Rather, it provides a sound basis for thinking about subsequent steps. Although further data is needed to refine and illustrate the recommendations, this study paves the way for collaborative and evolutionary work, with promising potential for the future.

One of the main limitations of this exercise lies in the fact that no citizen was involved at this stage, due to practical constraints. However, from the first meeting, it was agreed that each group member’s personal experience as a citizen would be valued as much as his or her professional expertise. This lack of direct citizen participation was nevertheless recognized as an important aspect to be improved, and all group members emphatically stressed that the next essential step would be to consult directly with the potential beneficiaries of empathic neighbourhoods.

Target audience

This document is primarily aimed at public officials, inviting them to become aware of the ethical, social inclusion and sustainability issues associated with the development of smart cities. It aims to provide them with guidelines that encourage the adoption of the concept of empathic neighbourhoods as an alternative to traditional models. By proposing an approach that is both systematic and adaptable, this document seeks to mobilize stakeholders in the creation of more inclusive and sustainable communities.

The study also challenges technologists and technology companies. It encourages them to design solutions that meet real community needs, and to anticipate the social, environmental and economic impacts of their innovations. By aligning their approaches with the principles of empathic neighbourhoods, they can play a key role in the development of more equitable and connected cities, while helping to reduce technological and social inequalities.

The study, which is aimed at both groups, aims **to promote constructive dialogue and collaboration between public officials and technologists, in order to maximize the impact of empathic neighbourhoods and foster fairer, more sustainable urban development**.

Objectives

The approach aims to:

- Propose a common definition of the emerging concept of the empathic neighbourhood;
- Provide the pillars and principles underpinning an empathic neighbourhood;
- Offer a general guide to the steps involved in setting up an empathic neighbourhood;
- Give an overview of the role that technology can play in this type of space;
- Provide recommendations to help democratize the empathic neighbourhood concept and encourage the approach in future land-use planning projects.

INTRODUCTION

Smart cities play an important role in providing technological solutions to various urban challenges, such as traffic management, energy optimization and waste collection. They have introduced the use of advanced tools such as the Internet of Things, open data and artificial intelligence (AI) to improve the efficiency and quality of life of their populations. Thanks to these innovations, they have succeeded in solving many of the problems associated with urbanization, making cities more functional and modern.

Figure 1 - The Smart City

Despite these advances, smart cities have revealed their limitations in the face of contemporary global challenges. They have sometimes exacerbated socio-economic inequalities by promoting centralized governance that favors private-sector interests. In addition, issues of privacy and surveillance have become increasingly worrying. These challenges show that, while smart cities have made significant improvements, they must continue to evolve to better meet the complex needs of communities and global crises such as climate change. It is therefore essential to reassess and adapt these approaches to ensure that they promote sustainable and equitable urban development (Koseki et al., 2022). This can be achieved by harnessing the collective intelligence of residents (Saunders and Baek, 2015) and realizing that a different use of technology is possible and necessary.

Rather than focusing solely on technological optimization, it's vital to explore approaches that emphasize inclusivity, resilience and sustainability. By integrating technologies in an ethical and participatory way, we can create environments that support the well-being of community members while promoting a more equitable and effective response to global challenges. This reappraisal would enable the use of technologies to improve not only urban efficiency, but also human well-being and environmental resilience.

It is in this context that the concept or approach of the empathic neighbourhood is emerging. The empathic neighbourhood approach is an optimistic approach that aims to ensure that human beings and their well-being are placed at the heart of urban planning decisions. An empathic neighbourhood is designed by and for the population concerned. It has no predetermined geographical or administrative boundaries. It is a living space that can be scaled to suit different needs. An empathic neighbourhood has no strict framework for implementation. It is guided by principles that will be listed below, such as the ethical and reasoned use of technology.

This study is therefore a first step. It is intended as an incentive for an audience of decision-makers to explore the transformation that has been taking place in the world of urban planning for several years, i.e., the need to make decisions based on the needs of users, and to anchor development policies in these needs, too (also known as the "bottom-up" approach). This approach generates social as well as economic benefits, as it promotes the sustainable adoption of government decisions (urban, provincial and federal) and thus financial gain in the medium to long term. In this bottom-up approach, technologies play an important role both in understanding needs and in finding solutions to complex problems. They can also serve as solutions in their own right.

In this study, the summary of the think tank discussions is organized around five axes. The first three situate the concept of an empathic neighbourhood by (I) answering the question of the need for such living spaces; (II) offering an open definition of the concept based on seven key principles; and (III) beginning a reflection on the steps involved in setting up such spaces. This is followed by (IV) a discussion of the place reserved for technology within an empathic neighbourhood, and the norms that govern it. In conclusion (V), we discuss the strengths, obstacles, opportunities and recommendations for moving on to the next stage, namely the implementation of empathic neighbourhood pilot projects.

WHY DO WE NEED EMPATHIC NEIGHBOURHOODS?

THINK GLOBALLY, CONNECT LOCALLY

More empathic neighbourhoods are needed to re-establish the link between people and the environment. The report Disruption on the Horizon, produced by Policy Horizons Canada (2024), draws attention to the fact that imminent threats such as the climate crisis pose serious challenges for modern cities. These findings are part of a global context marked by health crises, inflation, housing shortages and worsening climate disasters. Indeed, urbanization is inextricably linked to global challenges, and the continuation of current practices would lead to catastrophic scenarios. It is therefore becoming imperative to place resilience at the heart of urban, technological and economic policies in order to prepare cities for an unpredictable future, while taking into account regional disparities and the various possible development scenarios. The UN's Sustainable Development Goals (SDGs)[2], notably SDG 11 (sustainable cities) and SDG 10 (reducing inequalities), reinforce this need for inclusive, local and resilient approaches. .

Figure 2 Sustainable Development Goals

2. UN. "Sustainable Development Goals", [Online], [https://www.un.org/sustainabledevelopment/fr/objectifs-de-developpement-durable/] (Accessed August 3, 2024).

Yet, as some members of the think tank point out, one of the fundamental problems is that many people feel disconnected from these global challenges, such as climate change. This detachment often stems from a sense of powerlessness and growing anxiety: the more people suffer the consequences of these upheavals, the more exhausted they feel and the less inclined they are to fight these large-scale problems.

Empathic neighbourhoods play a fundamental role here, restoring the link between individuals and their environment. Empathy becomes a lever for enhancing well-being and happiness - crucial factors in giving people the motivation and energy to act locally on global challenges. Empathic neighbourhoods promote inclusion, social cohesion and essential services, enabling community members to empower themselves while improving their quality of life. By combining technology and well-being, empathic neighbourhoods aim to restore the ability to act locally against global threats.

II

WHAT IS AN EMPATHIC NEIGHBOURHOOD?

2.1. SIMILAR AND COMPLEMENTARY APPROACHES AND CONCEPTS

Before defining the concept of empathic neighbourhoods, it's first important to situate it. The idea of empathic neighbourhoods is part of a widespread movement in contemporary urban planning proposing new people-centered approaches. These approaches aim to prioritize human needs in order to rethink physical infrastructures. Many similar and often complementary approaches intersect and enrich each other to create communities that are more aligned with residents' aspirations and realities. Here is an overview of some of the other concepts and approaches relevant to the subject of this study. A graph at the end of the section shows how the empathic neighbourhood approach compares with other approaches, depending on the type of governance and solutions proposed (technological or social).

People-centred smart cities

Smart cities or smart neighbourhoods use technology to optimize their operations. Technology serves urban planning, development and management and, by extension, improves quality of life for citizens. Many forms of technology will feed into this approach, from geographic information systems software, the Internet of Things, cameras, drones and sensors, to digital twins and AI.

In an attempt to alleviate the above problems created by smart cities, UN-Habitat (2023) proposes the implementation of new international standards to transform smart cities into "people-centric smart cities". By focusing governance and technologies on the needs of people rather than administrations, this transformation of smart cities prioritizes inclusion, sustainability and human rights. This initiative aims to ensure that technological advances in cities do not exacerbate inequalities, but rather bridge gaps between communities.

Empathic neighbourhoods are therefore in line with this international recommendation and present themselves as a new way of rethinking technologies in the service of cities.

Cognitive cities

The "Cognitive city" model (PWC, 2023), adopted by cities such as Singapore and The Line, Saudi Arabia, is a form of urban development that goes beyond the traditional smart city model by incorporating AI, machine learning and cognitive computing. These technologies enable a city to learn, adapt and evolve autonomously.

The key difference between a smart city and a cognitive city lies in its level of intelligence and autonomy. Whereas a smart city collects and processes data to inform decisions, a cognitive city is able to interpret that data, learn from it and make autonomous decisions to address complex challenges such as sustainability, mobility and inclusivity. Cognitive cities are also designed to be "sentient", meaning they understand and adapt to the changing needs of the people who live there, creating a more human-centered urban experience.

The cognitive cities model stands out for its emphasis on open innovation, thanks to initiatives such as living labs. The emphasis is on co-creation, where solutions are designed and adapted through the active participation of end-users and consumers, ensuring that the technologies deployed truly meet citizens' needs. Although open to citizen feedback, this approach remains technocentric, and stems from collaboration between municipal institutions and technology companies.

15-minute cities

The 15-minute cities concept[3] advocates for the reorganization of cities so that all essential services and necessary amenities are accessible within a 15-minute walk or bike ride from home. This model aims to reduce car dependency, cut travel time and improve quality of life by bringing residents closer to the services they need every day, such as shops, schools, green spaces and health services. By encouraging short, active journeys, 15-minute cities also seek to encourage healthier, more sustainable lifestyles.

In addition to physical accessibility, 15-minute cities promote the creation of vibrant, dynamic neighbourhoods where social interaction is facilitated, and local communities can thrive. Through an urban organization centered around proximity and the integration of services, this concept aims to strengthen social fabric, foster community cohesion and create more resilient and inclusive urban environments. The solutions proposed by this model are not necessarily based on the use of technology.

Caring cities

The Caring cities approach is based on the concept of care, which emphasizes meeting people's emotional, social and practical

3. LIVE IN THE CITY. "The 15-minute city", [Online], March 23, 2021. [https://collectivitesviables.org/articles/ville-des-15-minutes.aspx] (Accessed September 5, 2024).

needs by creating urban environments that promote well-being through infrastructure and services focused on mental health, safety and social inclusion. This model strives to create supportive, resilient communities where all people feel valued and supported.

Enriched by the feminist perspective championed by the City for All Women Initiative (CAWI) (n.d.), this approach emphasizes the importance of integrating gender inequalities and power dynamics into urban planning. It is an approach that promotes gender equality by ensuring that policies and developments meet the specific needs of women and gender minorities, while guaranteeing safety and accessibility for all. This vision also includes a dimension of solidarity, decolonization and social justice, taking into account the perspectives of marginalized groups to ensure greater inclusion and equity in the urban environment.

Like 15-minute cities, the solutions proposed by this model are not necessarily based on the use of technology. For example, in the town of Sainte-Sophie, Quebec[4], a neighbourhood group has set up a caring initiative. Members call each other regularly to check on each other's well-being, reinforcing social ties and a sense of security. This encourages interaction between neighbours, breaks down isolation and creates an environment where everyone feels supported while remaining in their own home or neighbourhood. This local solidarity, without the need for heavy institutional structures, is based on interpersonal relationships and offers local care that enables residents to maintain their autonomy while being supported.

Inclusive and resilient neighbourhoods

The Inclusive and Resilient Neighbourhoods (QIR) approach implemented by the City of Montreal since 2023 seeks to improve the most vulnerable neighbourhoods by fostering greater collaboration between municipal services and community partners.

4. CITY OF SAINTE-SOPHIE. "Quartiers bienveillants", [Online], September 3, 2024. [https://www.stesophie.ca/actualites/informations-aux-citoyens/quartiers-bienveillants] (Accessed September 7, 2024).

This approach aims to overcome the limitations of traditional interventions by jointly integrating existing grants, expertise and programs to meet the specific needs of each neighbourhood. The choice of locations and the prioritization of interventions are established using the Living Environment Equity Index. The aim is to strengthen territorial equity and create more inclusive and resilient urban environments (Ellyson and Plouganou, 2024).

An emblematic example of this approach, the Saint-Pierre district in Montreal's Lachine borough, faces many challenges, including significant physical barriers, heavy traffic and lack of access to local resources and services. By applying the QIR approach, the City of Montreal seeks to overcome these obstacles by adopting collaborative local governance that coordinates efforts in social development, urban planning and the improvement of community facilities. However, the number of city departments involved increases the complexity of implementing QIR.

Happy cities

The Happy cities approach focuses on creating urban environments that maximize the happiness and well-being of residents (Montgomery 2014). It is based on the idea that city design should foster positive social interactions and encourage access to green spaces and healthy, active lifestyles. Happy cities strive to improve the quality of life for all citizens by strengthening their sense of belonging and creating inclusive, vibrant public spaces.

This approach focuses on the emotional impact of the urban environment, recognizing the importance of human relationships, safety and conviviality in city design. For example, the design of safe streets for pedestrians and cyclists, or the presence of accessible meeting spaces, encourages altruistic behavior and creates an atmosphere of collective benevolence.

The happy cities approach draws on research into urban psychology and the sciences of

happiness, incorporating principles that promote social connectivity and a sense of individual fulfillment. It also values citizen participation, enabling residents to become actively involved in decisions concerning their living environment, and to help create resilient and dynamic communities. This vision includes social justice through urban spaces that meet the needs of people from different socio-economic backgrounds, reduce inequalities and create more equitable environments.

Empathy as a guide: Integrating benevolent technologies for humane neighbourhoods

A summary of the concepts discussed shows that empathic neighbourhoods lie at the intersection of different contemporary urban approaches (Figure 3). They borrow ideas both from the concepts of smart, cognitive and caring cities and from those based on proximity, such as 15-minute cities. However, as we'll see throughout the study, empathic neighbourhoods stand out from the other concepts thanks to a subtle balance between technological enthusiasm and vigilance against lapsing into techno-solutionism. Their aim is not simply to impose technologies, but to adapt them to the real needs of residents, who are themselves actively involved in defining these needs and in the governance of their environment. These neighbourhoods strive to create sustainable solutions by promoting ongoing co-creation and ensuring citizen participation in governance.

The conclusion of this study will demonstrate that empathic neighbourhoods hold potential that is more than theoretical. Several stakeholders have already raised their hands to pilot this kind of approach. Ultimately, empathic neighbourhoods have the potential to catalyze a whole ecosystem of benevolent technologies and make Quebec a hub in the field.

Figure 3 Positioning the empathic neighbourhood approach

2.2. THE FOUR PILLARS OF AN EMPATHIC NEIGHBOURHOOD

An empathic neighbourhood is built by and for its members to create an inclusive and resilient environment with, where necessary, the help of benevolent technologies. Thus, the four main components of an empathic neighbourhood are the neighbourhood (or living space), empathy, governance and technology.

The 4 Pillars of the Empathic Neighbourhood Approach

Empathy: A driving force for resilience, solidarity and sustainability

Empathy is “the capacity of a person to identify with another person and to experience within him or herself the emotions or feelings felt by the other person”[5] . Empathy, whether applied to individuals, organizations or the environment, plays a central role in creating harmonious relationships. An empathic environment takes into account the emotions, needs and expectations of its users, enabling it to design more appropriate, accessible and humane solutions.

5. OFFICE QUÉBÉCOIS DE LA LANGUE FRANCAISE. “Empathy”, [Online], 2024. [https://vitrinelinguistique.oqlf.gouv.qc.ca/fiche-gdt/fiche/8400751/empathie] (Accessed September 5, 2024).

By actively listening to feedback and offering inclusive services, these environments build trust and sustainability in the adoption of solutions. Similarly, empathizing with the environment means adopting a sustainable and respectful approach that understands the impact of human actions on ecosystems and makes responsible decisions to preserve natural resources and protect the planet for future generations.

Empathy is also essential for promoting inclusion and diversity. It helps create environments where everyone feels respected and at home, because it recognizes and values people's different perspectives, backgrounds and realities. It helps us understand the challenges faced by marginalized groups and encourages the adoption of equitable and inclusive practices. In this sense, empathy becomes a powerful tool for building communities where diversity is not only accepted, but also perceived as a collective asset

Empathic neighbourhoods: Living spaces for emotional well-being

Designing an empathic living space (or "neighbourhood")[6] goes beyond simply satisfying functional and aesthetic needs. By focusing on spatial planning and the design of objects that generate emotional well-being, the empathic neighbourhood transforms urban environments into places that are not only practical, but also accessible, inclusive and sustainable (Biloria, 2021). In the design of such neighbourhoods, access to nature and engaging, playful, aesthetic aspects are prioritized. This means, among other things, paying particular attention to designing environments that are accessible, inclusive, sustainable and beautiful. Development projects must therefore demonstrate empathy by first identifying the desires and needs of the people who will use them.

6. The members of the think tank have decided to use the term "neighbourhood" in the expression "empathetic neighbourhood", although they associate it less with an administrative district and more with the French concept of "bassin de vie", i.e. "the smallest territory in which inhabitants have access to both everyday amenities and employment". [https://www.insee.fr/fr/metadonnees/definition/c2060] (Accessed August 2, 2024).

Empathic governance: Put yourself in the shoes of... to act better

Empathic governance implies that the process of implementing and maintaining solutions is done "by" and "for" the people concerned. For initiatives to be effective, it's important to understand the needs of community members, even if some needs may seem trivial. Past experiences, such as the failure of the Keyside project, Google Sidewalk or smart sidewalks in Ontario (Jacobs, 2022), have led to public outcry and demonstrate that a lack of prior consultation can lead to disappointing results. A bottom-up approach, based on consulting and listening to residents, helps to ensure that solutions are better aligned with local realities.

As part of empathic governance, it is essential to involve community members not only in the implementation of projects, but also in their ongoing evaluation. This enables solutions to be adapted in line with concrete feedback and evolving needs. Integrating the community into these processes enables governance to become a living mechanism, where everyone considers themselves a stakeholder and is involved in the success of initiatives. It is by putting ourselves "in the shoes" of the people concerned that continuous adaptation and sustainable adoption of change become possible.

Benevolent technologies: Serving people and the environment

Technologies, in and of themselves, are neither empathic nor benevolent; it is their use that can inspire empathy

in the people who use them. They can play a central role in creating empathic neighbourhoods by facilitating analysis of a specific context, structuring the consultation and communication process, and proposing concrete solutions to real-life problems. Technologies can be considered “benevolent” when they support human interaction (but do not replace it), and when they comply with sustainability standards such as ISO/UNPD[7], ethical standards concerning responsibility such as the Principles of Responsible AI (Université de Montréal, 2022) or B Corp standards[8], data governance, such as the First Nations Ownership, Control, Access and Possession (OCAP) principles[9], and accessibility, such as the Web Content Accessibility Guidelines (WCAG)[10].

Towards sustainable and inclusive communities through empathy

An empathic neighbourhood is not focused on technology per se, but rather on the conscious use of technology to serve the needs of residents and the environment. It’s a pragmatic, adaptable approach that relies on the participation of those involved, and offers a path to sustainable, inclusive communities.

An empathic neighbourhood is built through ongoing collaboration between various stakeholders, including residents, community associations, public authorities, businesses and academia. This type of neighbourhood emerges from a desire for local ownership and is based on listening to the needs of current and future residents. After observing and assimilating the context, municipal organizations can propose solutions adapted to the issues at stake, while businesses, whether technological or not, can respond to the challenges identified by the community. This cross-sector collaboration guarantees the sustainability of projects, creating sustainable, inclusive spaces where technology serves the needs of residents and the environment, rather than being an end in itself.

7. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. ISO/UNDP PAS 53002:2024 (en): Guidelines for contributing to the United Nations Sustainable Development Goals (SDGs), [Online], 2024. [https://www.iso.org/obp/ui/fr/#iso:std:87945:en] (Accessed September 29, 2024).
8. B LAB. About our Standards, [Online], 2024. [https://www.bcorporation.net/en-us/standards/] (Accessed October 7, 2024).
9. FIRST NATIONS INFORMATION GOVERNANCE CENTER. First Nations OCAP Principles, [Online], 2024. [https://fnigc.ca/fr/les-principes-de-pcap-des-premieres-nations/] (Accessed September 29, 2024).
10. GOVERNMENT OF CANADA. Web Accessibility Standard, [Online], August 1, 2011. [https://www.tbs-sct.canada.ca/pol/doc-fra.aspx?id=23601] (Accessed September 29, 2024).

2.3. SEVEN CARING PRINCIPLES FOR BUILDING AN EMPATHIC NEIGHBOURHOOD

An empathic neighbourhood doesn't follow a uniform model but takes the form of a variety of projects adapted to local needs and specificities, and relies on iterative rather than linear project management. It requires an agile and flexible approach, incorporating periodic reassessment to adjust to local realities and regulatory changes. Far from being rigid, this approach favors flexible solutions that respond to evolving characteristics and emerging issues. Indeed, **to guarantee its sustainability, an empathic neighbourhood must be modular and capable of evolving in order to remain relevant and useful**.

Although each empathic neighbourhood is unique, emerging from specific needs and local management, certain common principles, values and characteristics must be present in all projects. These fundamental principles provide a compassionate foundation for the creation of truly empathic spaces.

Principle 1

FOSTER A POSITIVE, HOLISTIC HUMAN EXPERIENCE

- Promote happiness and improve quality of life
- Design the neighbourhood to take into account people's daily realities
- Create welcoming, convivial public spaces conducive to encounters and exchanges
- Integrate art, culture, design and access to nature for an aesthetic everyday experience
- Prioritize the well-being of living beings, including humans, animals and plants
- Consider all dimensions of well-being: physical, social, intellectual, economic, spiritual and emotional

Principle 2

ENSURE SUSTAINABILITY AND RESILIENCE

- Leave a positive legacy for future generations
- Design spaces that minimize environmental impact and promote ecological transition
- Adopt sustainable energy, resource and waste management practices
- Use sustainable technological solutions
- Build community resilience to climate change and social challenges

Principle 3

ADOPT A SYSTEMIC APPROACH

- Understand and act in a specific context, i.e., consider the structural, cultural and political elements likely to interact in the neighbourhood at different territorial scales
- Promote collaboration between the various stakeholders involved

Principle 4

ADOPT A DECOLONIZING APPROACH

- Adopt an open posture in order to listen, consult and understand the realities of people living in the environment
- Value the knowledge of local, Indigenous, scientific and traditional communities
- Recognize and respect the rights of Indigenous peoples, including sovereignty over their lands, resources and data
- Avoid any form of external imposition and favour solutions co-constructed with the people concerned

Principle 5

PROMOTE DIVERSITY AND INCLUSION

- Ensure universal accessibility for active participation in neighbourhood life
- Encourage social, economic, functional and cultural diversity to create a rich and stimulating environment
- Promote diversity of use of common areas, services and shops to meet the varied needs of residents
- Ensure respect for the rights and safety of all individuals

Principle 6

ESTABLISH PARTICIPATORY AND ACCESSIBLE GOVERNANCE

- Implement collaborative and inclusive governance that actively involves the local population
- Transparent, accountable decision-making processes
- Pool the resources, skills and knowledge of the various stakeholders
- Educate and raise awareness as you go along
- Set up collective support mechanisms to prevent volunteer fatigue

Principle 7

DEPLOY TECHNOLOGIES FOR THE COMMON GOOD

- Use technology to improve quality of life and stimulate interaction
- Make technologies and their conditions of use accessible
- Adopt safe, ethical and sustainable technological solutions
- Promote the rational use of technology for personal, collective and planetary well-being

III

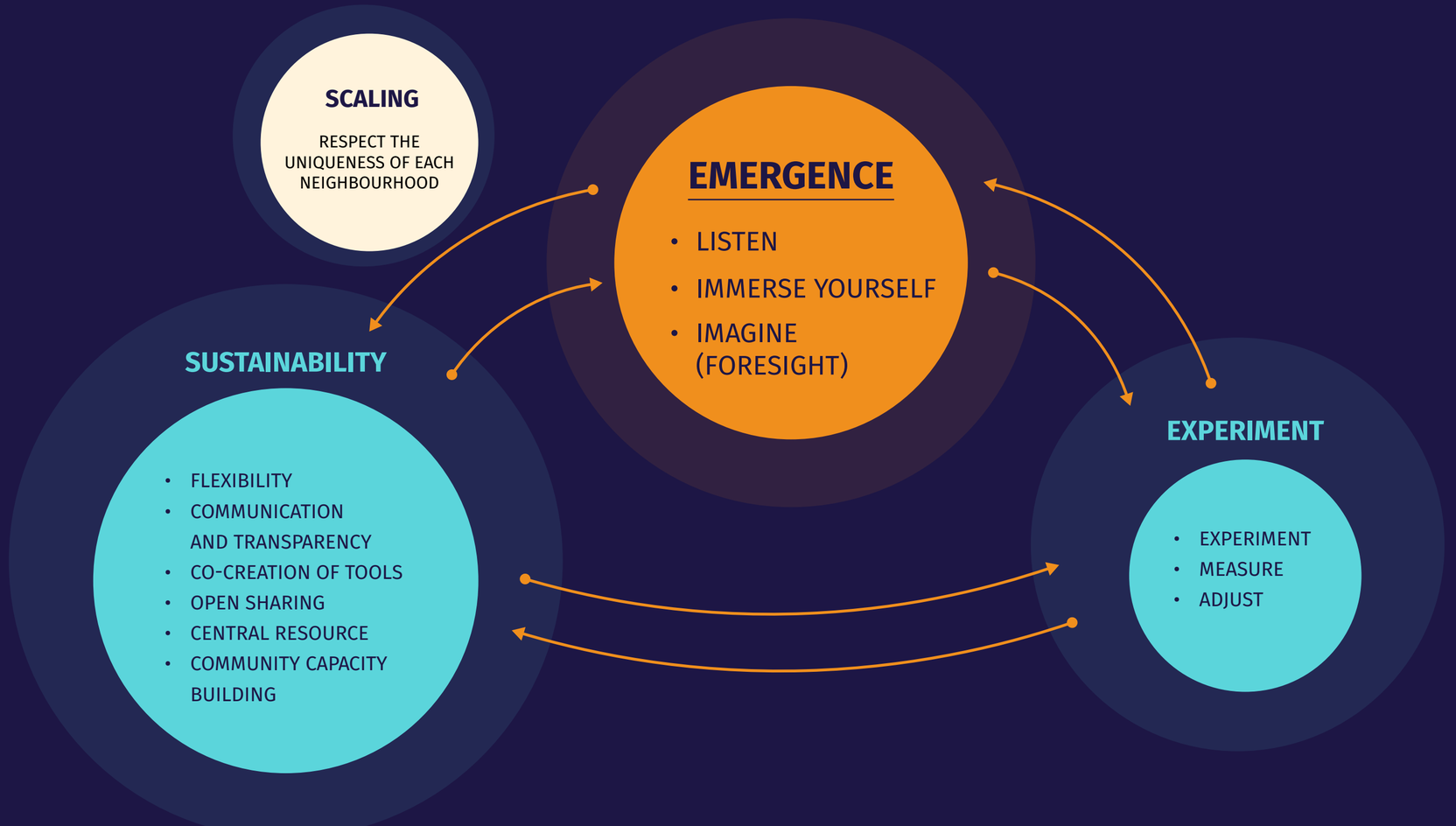
DEVELOPING AN EMPATHIC NEIGHBOURHOOD: A COLLABORATIVE AND ADAPTABLE APPROACH

This section is based on in-depth discussions between members of the think tank concerning the implementation of an empathic neighbourhood, drawing a parallel with the life-cycle diagram of a social innovation proposed by the *Réseau québécois en innovation sociale* (RQIS, 2022).

According to this diagram, a social innovation evolves through four phases: emergence, experimentation, sustainability with change of scale, and institutionalization. Think tank discussions helped to link these stages to the specific features of the life cycle of an empathic neighbourhood, highlighting the key elements that contribute to its development.

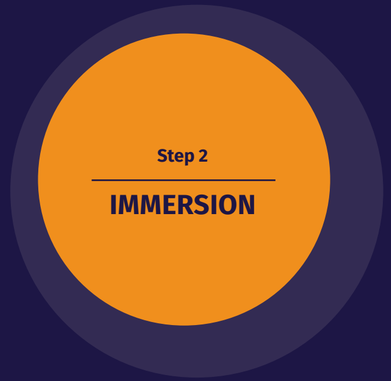
Emphasis was placed on the specific aspects of creating an empathic neighbourhood, without going into exhaustive detail about the scheme. The use of social innovation tools, such as the life-cycle diagram proposed by RQIS, provides a rigorous methodological framework for structuring and analyzing initiatives, while guaranteeing project sustainability and stakeholder participation. Drawing on proven practices, the process encourages adaptability and the continuous evolution of projects over the long term.

Figure 5 - The life-cycle of a social innovation adapted to the empathic neighbourhood



3.1. FAVOURABLE CONDITIONS FOR THE EMERGENCE OF EMPATHIC NEIGHBOURHOOD PROJECT

The emergence phase of a social innovation includes exploring problems, needs, aspirations and opportunities with stakeholders. It's about trusting in the collective intelligence of community members and recognizing that the people who live in a certain environment are its experts. For a neighbourhood to be truly empathic, it is important at this stage to ensure that all voices, including those that are usually more discreet, are heard and taken into account. For example, in response to the rise of screen addiction and the hyper-connected nature of our world, some people might want a public space designed for disconnection.

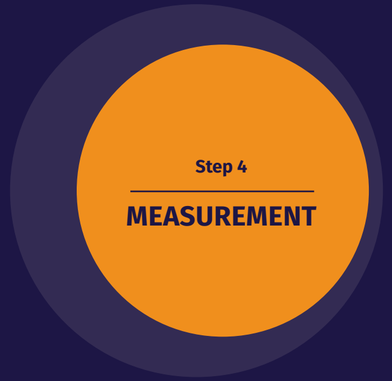


Before embarking on the development of an empathic neighbourhood, it's essential to immerse oneself in an environment and thoroughly analyze the context in which the project takes place. This means not only completing a technical assessment of the infrastructure or regulations in force, but also developing a refined understanding of the social, cultural and economic realities of community members. The idea is to adapt the project to the local context in which it is to be integrated.

Armed with this understanding of local needs, a group can develop a shared, ambitious vision of an empathic neighbourhood using, for example, foresight techniques[11]. This vision should not simply be an abstract ideal, but a concrete and inspiring image, shaped by the dreams and ideas of those who live in the neighbourhood. Using simulations and prototypes, it becomes possible to visualize these ideas before they are even implemented.

11. GOVERNMENT OF CANADA. Policy Horizon Canada: Resources, [Online], September 17, 2024. [https://horizons.service.canada.ca/fr/ressources/index.shtml] (Accessed September 23, 2024).

3.2. FAVOURABLE CONDITIONS FOR EXPERIMENTING WITH EMPATHIC NEIGHBOURHOOD PROJECTS EMPATHIQUES



The evolution of the concept of empathic neighbourhoods relies on a constant ability to evaluate and measure the impact of the actions undertaken. Rather than setting fixed objectives, it is useful to define flexible indicators, capable of adapting to the changing reality of the project, using tools such as the theory of change[12] . These indicators need to be co-constructed with the people involved, so that they measure not only technical advances, but also the human, social and environmental impacts resulting from the project.

12. LE RÉSEAU QUÉBÉCOIS EN INNOVATION SOCIALE. Projet outils d'évaluation en innovation sociale, [Online]. [http://www.rqis.org/innovation-sociale/projet-doutils-devaluation-en-is/] (Accessed September 23, 2024).

Moving towards an empathic neighbourhood is not a straight line. It's a process in which experimentation and adjustment play a central role. Pilot projects provide a space for testing ideas in real-life conditions, while taking feedback from involved partners into account.

3.3. CROSS-FUNCTIONAL CONDITIONS CONDUCIVE TO SUSTAINABILITY

Flexibility: It's essential to establish flexible and sustainable governance, while diversifying funding sources. This allows us to maintain an active listening ear and an open dialogue with the community, so that the neighbourhood stays in tune with its residents and their changing realities.

Communication: Transparency and regular communication on progress, successes and challenges are essential to maintaining community trust and commitment. Every step along the way, from small victories to major adjustments, must be shared with those who bring the neighbourhood to life on a daily basis, in a spirit of constant co-construction.

The creation of tools: Knowledge transfer within the community requires suitable tools to facilitate the adoption of new technologies or services. The aim is to create mechanisms that enable everyone to appropriate this knowledge autonomously and progressively. By focusing on the co-construction of tools with beneficiaries, the knowledge transfer process becomes more inclusive and effective, ensuring that community members don't just receive information, but master it and can turn it into a lever for transformation in their daily lives.

Open sharing: Sharing lessons learned and best practices with other projects and communities is equally essential to long-term sustainability. Documenting the steps taken, the solutions found and the challenges overcome not only strengthens the continuity of the project, but also inspires other similar initiatives. By making this knowledge available, the group participates in a wider network of mutual support and learning, which benefits not only the neighbourhood, but all players involved in social innovation projects.

Maintaining a central resource: To guarantee ongoing commitment, it is often necessary to appoint people in charge (why not an "architect of social links" or a "curator of collaborations"?) whose role is to maintain these living links between neighbourhood stakeholders. These people need to be paid to ensure the coordination of actions and the continuity of relationships, while ensuring that the soul of the empathic neighbourhood, based on inclusion and collaboration, endures over time.

Community empowerment: At the same time, it is vital to encourage the empowerment of local forces, giving community members the means and responsibilities to participate actively in the management and evolution of their environment. This strengthens not only their sense of belonging and involvement, but also the communities' ability to meet their own needs.

3.4. TOWARDS A LIVING LABORATORY OF EMPATHIC NEIGHBOURHOODS?

To ensure that these fundamental stages in the development of more empathic neighbourhoods are respected, it is necessary to set up living laboratory projects. These spaces would enable innovative strategies to be tested and adapted on an ongoing basis, while providing a framework for experimenting and adjusting practices in line with local realities. By collaborating with partner organizations such as the *Laboratoire en innovation ouverte* (LLio)[13] or the *Maison de l'innovation sociale* and its civic innovation laboratory for regulatory experimentation[14], this living laboratory could serve as a platform for co-creation and the evolution of practices, ensuring that empathic neighbourhoods remain responsive, dynamic and truly adapted to the needs of their communities. Only then will it be possible to scale up the concept and eventually think about exporting the model.

13. LABORATOIRE EN INNOVATION OUVERTE. Le laboratoire en innovation ouverte, [Online]. [https://llio.quebec/] (Accessed September 23, 2024).
14. MAISON DE L'INNOVATION SOCIALE. Le LICER, un laboratoire qui s'intéresse à l'innovation réglementaire comme levier à la transition, [Online]. [https://www.mis.quebec/projets-dinnovation-sociale-realises/2021/03/04/licer-laboratoire-innovation-civique-experimentation-reglementaire/] (Accessed September 23, 2024).

IV

WHAT PLACE DOES TECHNOLOGY HAVE IN AN EMPATHIC NEIGHBOURHOOD?

In an empathic neighbourhood, technology should be used as a tool without being omnipresent. Carefully selected, its purpose is to improve the daily lives of community members and strengthen the social fabric. Whether low-tech or high-tech, its integration must always respond to real needs expressed on the ground.

4.1. POSSIBLE USES OF TECHNOLOGY IN AN EMPATHIC NEIGHBOURHOOD

Integrating technology into an empathic neighbourhood can enrich the experience of residents and improve their quality of life in many ways. Here are a few examples of how technology can enrich community life and improve quality of life (+), while highlighting the importance of respecting certain criteria and limits (-) to ensure balanced, inclusive use and preserve accessibility for all.

Communication and community participation

+ Digital tools such as public consultation apps, socio-financing platforms, electronic voting platforms for local decisions and participatory mapping tools can greatly facilitate communication and participation among residents. These technologies offer community members the opportunity to signal their needs, propose ideas and become actively involved in neighbourhood projects. What's more, these technologies encourage exchange and ensure wide dissemination of important information.

- However, it is necessary to go beyond digital data and take into account the voices of people who prefer not to express themselves online, or who are unable to do so. This means going beyond digital solutions to create physical spaces and public forums that enable people who can't or don't want to express themselves online to participate fully.

Facilitation and assistance

\+ Technologies can be used to improve urban services and make cities safer and more user-friendly for everyone. For example, pedestrian-friendly traffic lights, equipped with intelligent sensors to adjust duration according to pedestrian flow, can greatly improve user safety, especially for the elderly or those with reduced mobility. Similarly, coordinating sidewalk snow clearance via a digital platform enables resources to be managed more efficiently, prioritizing the busiest areas and guaranteeing unhindered access, even in inclement weather.

\- However, these innovations must be designed to integrate harmoniously with existing infrastructures, taking into account local realities and the precise needs of residents. It is essential that technologies are simple to use and accompanied by non-digital options to ensure that all residents, without exception, can benefit from them.

Socializing and connecting

\+ Platforms for sharing goods[15], augmented reality applications to connect isolated people with their loved ones or with nature[16], conversational avatars[17], interactive screens or even intergenerational matchmaking applications can greatly promote socialization and connection within communities.

\- However, these tools must be designed to reinforce human interaction rather than replace it, ensuring that technology remains a support and not a barrier. As a complement to online interactions, it would be pertinent to offer workshops or physical spaces where participants can meet in a safe and welcoming setting, ensuring that technology is used as a springboard to real relationships, and not as a substitute for face-to-face interactions.

Autonomy and inclusion

\+ Examples of technologies promoting autonomy and inclusion include AI for the production of inclusive public spaces[18] ; voice-assistance software and indoor navigation guides, which use geolocation and Bluetooth beacons to enable visually impaired people to move around autonomously in complex spaces such as grocery stores[19] ; translation applications to improve intercultural communication; or telepresence technologies enabling immobilized people to participate in social or professional events remotely..

\- However, to guarantee balanced and inclusive use of technologies, it is essential to respect certain criteria, such as reliability, ergonomic interfaces, compatibility with assistive devices, end-user involvement and system interoperability. It is also important to set limits, particularly with regard to the protection of personal data.

Environmental resilience

\+ Sensors for street lighting management, smart waste management and air and water quality monitoring contribute to environmental resilience. Smart power grids balance the supply and demand of renewable energy in real time to optimize its use. Adaptive street lighting adjusts brightness according to the presence of pedestrians or vehicles, and reduces light pollution. Last but not least, biodiversity monitoring systems

15. The Partage Club application (https://www.partage.club/)
16. JARDIN BOTANIQUE DE MONTRÉAL. Radio Plantes, [Podcast], 2024. [https://lpalo.com/balado/radio-plantes-la-radio-par-et-pour-les-plantes/)]
17. The Olivia chatbot (https://www.linkedin.com/feed/update/urn:li:activity:7242171182991519744/)
18. Evadia+ technology (https://unesco-studio.umontreal.ca/project%20launched/2024/09/25/evadia_launch.html)
19. The Edge A-Eye application (https://www.youtube.com/watch?v=-0MuTmgOTYI)

monitor the presence of species in green spaces and contribute to better management of urban flora and fauna. These technologies strengthen the resilience of cities in the face of environmental challenges

- However, it is essential to respect certain criteria, such as compatibility with existing infrastructures, energy efficiency, and ease of use. Limits must also be set, such as ensuring that automation does not completely replace the human being, avoiding total dependence on technology, and guaranteeing the protection of collected data.

Aesthetics and pleasure

+ Interactive parks[20], multimedia installations[21] such as digital murals, holograms or other types of augmented reality, home automation[22] or environmental sonification can add an aesthetic and playful dimension to public spaces. For example, digital murals can display collaborative works of art, and artistic augmented reality applications allow visitors to discover virtual creations. Sound gardens enrich the sensory experience with soothing sounds, while connected gardens react to visitors with lighting effects, creating a unique interaction.

- However, to guarantee the balanced and responsible use of these technologies, it is essential to respect certain criteria, such as energy efficiency, the use of sustainable materials and accessibility for all, including people with limitations. At the same time, limits have to be set with regard to, among other things, reducing noise and light pollution to avoid disturbing local residents and wildlife, and ensuring regular maintenance to prevent safety risks and maintain the aesthetic appeal of the installations.

Education and learning

+ Among the technologies that can impart essential knowledge and skills are historical markers, emotional intelligence learning tools, virtual reality (VR) applications and Fab Labs. For example, VR applications can be installed in public places such as libraries to enable users of all ages to explore various subjects in an immersive way. Fab Labs, meanwhile, offer community spaces where people can learn to use digital fabrication technologies, such as 3D printing, to develop practical skills and stimulate group creativity.

- However, it is essential to preserve the balance between learning spaces and other uses of public spaces to prevent these installations from becoming intrusive. Interfaces must be easy to use, to reduce barriers to learning, while durability of equipment guarantees longevity and limits environmental impacts. Furthermore, user safety, particularly in Fab Labs, must be ensured through appropriate instructions and training, to minimize the risks associated with handling equipment.

Emergency situations

+ Alert systems via text messaging, mobile applications, or electronic signs rapidly broadcast critical information to the population. Drones fly over inaccessible areas, providing real-time images to guide rescue efforts, while robots intervene in dangerous situations, such as detecting gas leaks. Mobile geographic information systems (GIS)[23] map danger zones to

20. The UGO interactive and connected game module (https://www.goelan.com/ugo)
21. Multimedia company Moment Factory (https://momentfactory.com/)
22. Connectologie home automation package (https://www.connectologie.ca/)
23. Humanitas (https://www.humanitas.io/)

coordinate rescue operations, and sensors continuously monitor the condition of critical infrastructures, triggering alerts in the event of problems.

- However, it is essential that these technologies function even when traditional networks are cut, via satellite systems or autonomous networks. What's more, these tools must remain simple to use, with intuitive interfaces and clear messages, enabling rescue teams and the population to react effectively, even in situations of intense stress.

In conclusion, technologies offer multiple possibilities for enriching the life of an empathic neighbourhood. However, they must be designed and used in a caring way, ensuring that they are accessible, inclusive and designed to meet the real needs of residents. Finally, technology should never replace human interaction, but rather reinforce it, and it must be simple and intuitive to use.

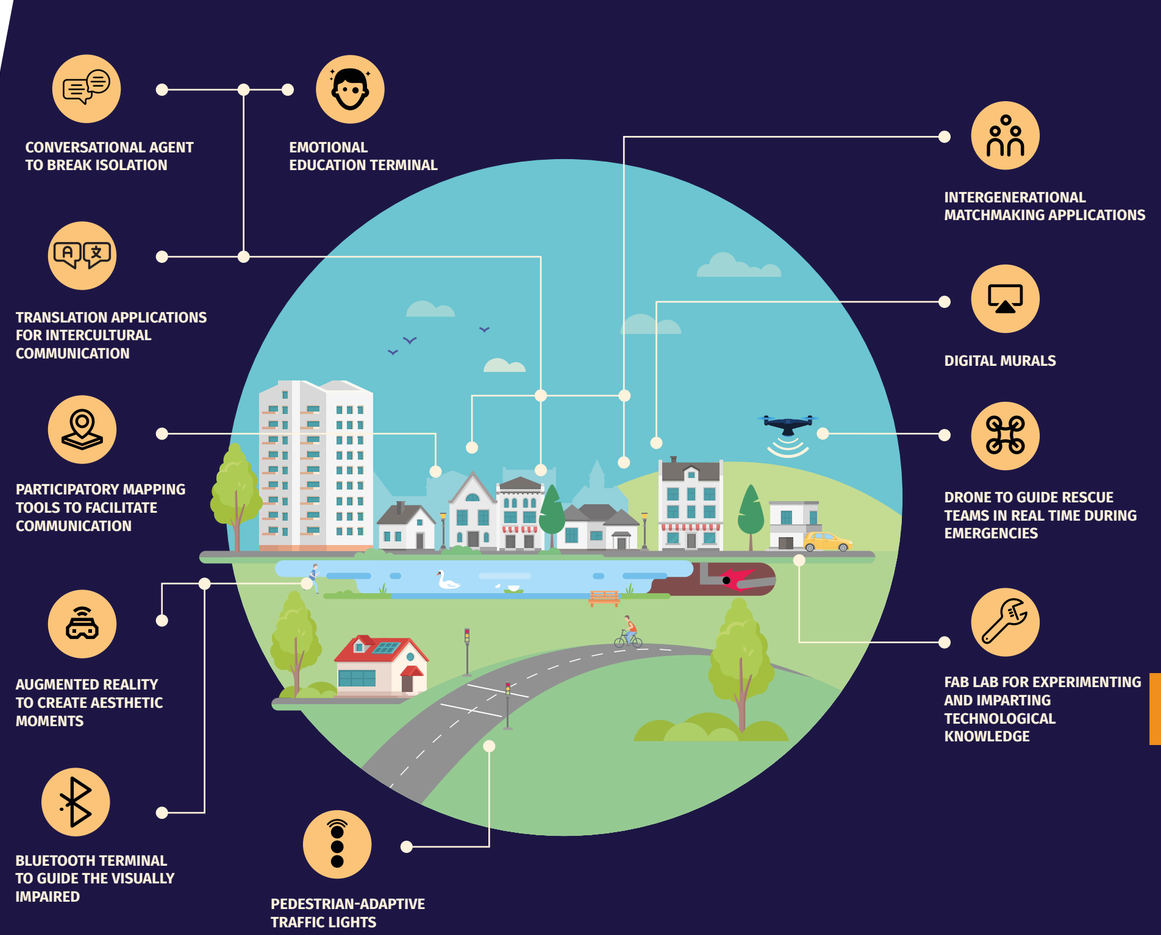


Figure 6 – Benevolent technologies in an empathic neighbourhood

4.2. ETHICAL SAFEGUARDS FOR BENEVOLENT TECHNOLOGIES

Here are the ethical safeguards for designing benevolent technologies.

- **Transparent use**: Inform about data collection, use and storage, while limiting collection to what is strictly necessary.
- **Data protection**: Ensure the confidentiality and security of personal information through robust measures.
- **Data sovereignty**: guarantee control over personal data, including options such as the right to be forgotten.

- **Open-source technologies**: Promote open-source technologies to enable communities to adapt them to their needs, while guaranteeing transparency.
- **Low tech**: Use technologies that are simple, affordable and accessible to marginalized populations.
- **Reliability**: Guarantee reliable, accessible technologies, with technical support and options in case of failure.
- **Universal design**: Ensure that technologies comply with accessibility standards and are understandable and robust.
- **Digital literacy**: Promote digital education to enable critical and responsible use of technologies.

- **Environmental impact**: Favour energy-efficient, sustainable and recyclable technologies.
- **Local infrastructure**: Encourage the development of local solutions and data hosting

- Use technology to support social ties, encouraging connection rather than individualization.

By respecting these principles, empathic neighbourhood technologies can help create an inclusive, sustainable environment that strengthens the social fabric, while equitably meeting the needs of community members. However, even if these technologies meet these ethical criteria, imposing them without consultation reduces the chances of sustainability.

It is essential that the choice of technologies is the result of a collaborative process that takes into account the needs and preferences of the people using them. To achieve this, precise steps must be followed, as detailed in the next section, to ensure that technological solutions are adopted, sustainable and long-lasting.

4.3. STEPS FOR SELECTING TECHNOLOGICAL TOOLS FOR AN EMPATHIC NEIGHBOURHOOD

The first step is to carry out an in-depth needs analysis. This involves consulting a large number of people and using community intermediaries such as family carers and social workers to gather information on the precise needs of marginalized populations. Fundamental to this analysis is the inclusion of technologically marginalized groups, such as the homeless, those without the necessary equipment, children and the digitally averse.

This stage involves identifying emerging and existing technologies likely to meet the needs identified. It is useful to ask several questions: What barriers can the technology mitigate or eliminate? Why choose this technology, and what is the objective? What are the risks associated with its use or absence? Is there a risk of exacerbating the digital divide? It is also essential to validate each technology's alignment with guiding principles, financial capacity, interoperability with existing infrastructure, potential impacts and the level of digital literacy required.

Step 2

EXPLORATION AND CHOICE

Step 3

EXPERIMENTATION

The development of pilot projects is essential to test technologies in real-life conditions before deploying them on a large scale. These experiments should encourage gradual adoption, taking users' values into account. The aim is to encourage smooth change, with support and training mechanisms to sustain the transition, especially if resistance emerges. Constant feedback from the community during the experimentation phase ensures that technologies can be adjusted to local needs, guaranteeing the adoption of effective, well-accepted solutions.

Étape 4

DEPLOYMENT AND SUPPORT

Once technologies have been tested and approved, they can be deployed on a larger scale. This deployment process must include adequate training for users, ongoing support and regular maintenance. User training and support is essential for successful adoption and for improving the digital literacy of everyone involved.

Étape 5

ONGOING ASSESSMENT

After deployment, it is important to monitor and evaluate the impact the technologies have on the quality of life of community members. This evaluation enables strategies to be adjusted and technologies to evolve in line with feedback and emerging needs.

THE IMPORTANCE OF SOCIAL RETURN ON INVESTMENT (SROI)

By integrating these steps into the process of selecting and implementing technology, empathic neighbourhoods can ensure that the solutions chosen are truly adapted to the needs expressed by the community, and that they contribute to well-being.

While these ethical safeguards may seem daunting to business people, members of our Idea Lab pointed out that there are many people dedicated to developing benevolent technologies, even at the expense of a rapid return on investment (ROI). Often, these people are motivated by personal experiences that drive them to persevere in their mission to improve social return on investment (SROI). However, they must overcome other important challenges.

4.4. THE CHALLENGES OF DEVELOPING BENEVOLENT TECHNOLOGIES

The development of technologies for empathic neighbourhoods presents an exciting opportunity to improve human well-being and quality of life. However, this technological adventure comes with significant challenges, especially for entrepreneurs committed to creating tools that promote social progress beyond mere financial profitability.

Challenge 1

THE CHALLENGE OF INVESTMENT IN RESEARCH AND DEVELOPMENT

The creation of technologies that respond precisely to community needs requires considerable investment in research and development, to ensure that high ethical standards are met. These costs can represent a major obstacle, particularly for start-ups.

To reconcile social impact and financial profitability, it is crucial to explore and implement innovative business models. Entrepreneurs need to find ways of demonstrating that benevolent technologies can generate financial benefits while having a positive impact on society.

Challenge 2

CREATING BUSINESS MODELS THAT RECONCILE SOCIAL IMPACT AND PROFITABILITY

Challenge 3

MAINTAINING ONGOING COLLABORATION WITH USERS

Close cooperation between technology developers and potential users is essential. This collaboration must be maintained throughout the development process to ensure that tools meet real community needs effectively.

Challenge 4

STRENGTHENING LOCAL TECHNOLOGICAL EXPERTISE

Communities need to ensure that they have sufficient local technological expertise to oversee and manage the digital systems in place. This means training local teams and creating appropriate governance structures.

Public ignorance and distrust of new technologies are major challenges. Ongoing awareness-raising and education efforts are needed to encourage the adoption of these technologies and boost user confidence.

Challenge 5

OVERCOMING MISTRUST THROUGH AWARENESS-RAISING AND EDUCATION

THE USE OF BENEVOLENT TECHNOLOGIES BEYOND EMPATHIC NEIGHBOURHOODS

Once these challenges have been overcome, the development of benevolent technologies can truly transform neighbourhoods into more inclusive, sustainable environments conducive to the well-being of all residents. What's more, these technologies can also provide innovative solutions to challenges in other sectors, such as health and education, by improving access to care, facilitating learning and strengthening essential public services. Their impact can extend beyond neighbourhood boundaries, contributing to a better quality of life and greater social equity in a variety of areas.

V
SUMMARY AND FUTURE DIRECTIONS

5.1. THE STRENGTHS OF THE EMPATHIC NEIGHBOURHOOD MODEL

Strength 1

AN INTEGRATED, CROSS-DISCIPLINARY MODEL

The empathic neighbourhoods model is distinguished by its integrative, cross-cutting approach, which enables social issues to be addressed holistically, rather than in silos, for a given location (a place-based approach). By approaching social challenges from the unified angle of a place, this model fosters a coherent, coordinated response to the varied needs of communities, contributing to a perennial improvement in human well-being and planetary resilience.

For example, collaborations with organizations such as the Canadian Centre for Safer Communities[24] enable us to explore new avenues for strengthening the resilience of neighbourhoods in the face of current risks and threats, while integrating safety practices adapted to local realities. The empathic neighbourhood approach can also provide an opportunity to integrate disease prevention initiatives in collaboration with organizations such as the *Association Pour la Santé Publique du Québec* (ASPQ). [25]Prevention programs, awareness-raising activities and public health interventions tailored to local realities could thus help improve residents' general health and reduce the risks of illness and isolation in the community.

24. Organizations such as the Canadian Centre for Safer Communities have already contacted Numana about potential collaboration.
25. The Association Pour la Santé Publique du Québec is currently working with Numana on a preventive health project.

Strength 2

GENERATING SOCIAL AND ECONOMIC BENEFITS

Empathic neighbourhoods generate considerable social benefits that translate into significant economic gains for Quebec. By improving communities' quality of life, safety and sense of belonging, empathic neighbourhoods foster greater social cohesion. Among other things, this helps reinforce local economic stability by attracting new members and businesses to the community. What's more, by promoting sustainable practices, these neighbourhoods help reduce public spending on resource management and environmental health. As a result, they offer substantial savings on health and mental health spending, by providing environments conducive to the well-being and psychological resilience of community members.

In this way, empathic neighbourhoods generate tangible social benefits, while also generating economic gains and savings for public finances by optimizing health and environmental spending.

5.2. OBSTACLES, OPPORTUNITIES AND RECOMMENDATIONS FOR BUILDING EMPATHIC NEIGHBOURHOODS

Obstacle 1

THE CHALLENGES OF CROSS-SECTOR FINANCING

The development of empathic neighbourhoods faces many obstacles, with cross-sector funding being one of the main challenges. Living labs, essential for testing and refining technologies in real-life conditions, often struggle to secure the funding needed to complete their large-scale expansion. This difficulty is exacerbated by a concentration of financial resources on specific projects, such as those related to aging, to the detriment of other equally important community issues. This lack of financial support, particularly for innovative and diverse projects, limits the scope for experimentation and innovation in a variety of contexts, reducing the ability to create truly inclusive and empathic environments..

Opportunity 1 - Leveraging existing initiatives

One opportunity lies in leveraging the empathic neighbourhood models already in place, as well as in technology companies that have demonstrated their effectiveness in this field. By building on successful experiences and the best practices that emerge from them, it is possible to strengthen current initiatives and accelerate the adoption of solutions under development. These models could be adjusted to meet the specific needs of new neighbourhoods, while optimizing their impact. By capitalizing on these successes, we can better guide future funding, avoid mistakes and optimize available resources.

Recommendation 1 - The creation of living laboratories dedicated to empathic neighbourhoods

To fully support the development of empathic neighbourhoods, we need to create a funding program dedicated to cross-sectoral, interdisciplinary living laboratories. This program could draw inspiration from existing initiatives in fields such as aging or urban transitions. By paying particular attention to the specificities of empathic neighbourhoods, this funding would make it possible to first release the resources needed to encourage the qualitative needs analysis, and then implement technological solutions and the evaluation phase. The creation of living laboratories would thus help to test and refine solutions adapted to the evolving needs of communities..

Obstacle 2

THE RETURN ON INVESTMENT (ROI) OF ETHICAL TECHNOLOGIES

The development of benevolent technologies, which respect high ethical principles in terms of data management, accessibility and sustainability, poses a significant financial challenge. Unlike companies that do not consider these issues, those seeking to reconcile social impact and profitability often have to invest heavily in research and development. As a result, the return on investment (ROI) of these technologies is often slower to materialize.

However, the social return on investment (SROI)[26], which measures the benefits to society as a whole, is generally much greater and more sustainable. This type of return includes benefits linked to social cohesion, reduced inequalities and improved quality of life, which translate into economic gains. To overcome these challenges, innovative business models and increased financial support are needed to reconcile ethical requirements with economic viability.

26. SOCIAL VALUE INTERNATIONAL. The Guide to SROI, [Online]. [https://www.socialvalueint.org/guide-to-sroi] (Accessed September 23, 2024).

Opportunity 2 - Setting a standard for benevolent technologies

The development of a standard dedicated to benevolent technologies represents a major opportunity to structure this sector ethically and effectively. In addition, this standard would serve as a reference for funding programs, making it easier to assess projects in terms of their contribution to sustainable development objectives. Furthermore, the widespread use of an SRL scale (societal readiness level; Bruno, Donarellli et al., 2019) in addition to a TRL scale (technological readiness level)[27] specifically adapted to benevolent technologies, would make it possible to monitor the progress of technologies at each phase of their development, while integrating ethical issues.

Recommendation 2 - The development of an economy centred on benevolent technologies

To fully support innovation in this field, we recommend the creation of a benevolent technology development fund. This fund is needed to overcome the financial obstacles associated with research and development, which are often more costly for ethical companies. By reducing the financial risks for entrepreneurs and start-ups, this funding mechanism would encourage significant advances in the creation of benevolent technology solutions.

Living laboratories in empathic neighbourhoods could play a central role in hosting pilot projects, enabling technologies to be tested and refined under real-life conditions. These local experiments, carried out in a transparent manner with the willing

27. GOVERNMENT OF CANADA. Technology readiness levels, [Online], January 23, 2018. [https://ised-isde.canada.ca/site/innovation-canada/en/technology-readiness-levels] (Accessed September 23, 2024).

participation of users, would facilitate future commercialization, while ensuring that solutions are adapted to community needs. In this way, the fund would contribute not only to innovation, but also to the creation of a specifically Quebec-based economy centred on benevolent technologies and integrating social, ethical and economic values.

Obstacle 3

RIGIDITY OF THE REGULATORY FRAMEWORK

Current urban planning regulations are often inflexible and ill-suited to new technologies or innovative methods. This rigidity can slow down the development of empathic neighbourhoods, limiting the ability to implement innovative projects. What's more, approval processes are often lengthy and complex, adding an administrative burden that discourages many project developers. These obstacles hinder innovation and delay the implementation of solutions needed to meet changing community needs.

Opportunity 3 - Adapting regulatory frameworks for greater flexibility

To support innovation in empathic neighbourhoods, it is essential to reassess and adapt existing regulatory frameworks, particularly in terms of urban planning. Revising these frameworks would make it possible to create an environment more conducive to experimentation and the integration of innovative technologies and ideas. Simplifying administrative procedures, meanwhile, would encourage creativity while maintaining adequate protection for users and respecting the social and ethical objectives of empathic neighbourhoods.

Recommendation 3 - Create synergies with existing initiatives

To overcome these challenges, it is advisable to collaborate with existing organizations that are already working to make regulatory frameworks more flexible. For example, the *Maison de l'innovation sociale* has launched initiatives aimed at making regulations more flexible to better meet the needs of social innovations. Its Civic and Regulatory Innovation Laboratory (LICER) tests solutions for moderating regulation in various fields.

Within the framework of empathic neighbourhoods, a similar initiative could be set up, focusing specifically on urban planning regulations. This laboratory would test solutions for adjusting rules and supporting local innovation, while guaranteeing safety and inclusivity. Collaboration with entities that are already experts in managing regulatory frameworks would create an effective synergy that facilitates the integration of new ideas while responding to contemporary urban challenges.

IN CONCLUSION

The empathic neighbourhoods approach is a positive and ambitious vision of the future. Since the work leading up to this study began, it's clear that the subject of empathic neighbourhoods is generating a great deal of interest. Several communities have already expressed their desire to become the first to adopt and test this innovative approach[28] . By encouraging active collaboration between residents, technology companies, public authorities and community organizations, these neighbourhoods have the potential to profoundly transform the way we live and interact with our urban environment.

By encouraging the emergence of an ecosystem of benevolent technologies, Numana is paving the way for a future in which individual well-being is given top priority, while generating benefits for the community as a whole.

Quebec has the opportunity to become a leader in implementing these innovations, and to position itself as a model for other regions of the world. There is no doubt that the social, sustainable and economic impact of these initiatives will contribute not only to building more resilient, inclusive and harmonious communities, but also to stimulating local economic growth, creating jobs and strengthening Quebec's competitiveness in the benevolent technologies sector.

28. A pilot project is currently being set up with the Fondation Berthiaume-du Tremblay, which would like to begin ethnographic research as soon as possible to understand the need for benevolent technologies among the population of the Quartier des générations (located in the Ahuntsic district of Montreal). Other stakeholders, such as the Vallée de la transition énergétique innovation zone, have expressed interest in adapting this approach to the social challenges encountered within their area of operation.

APPENDIX 1

EXAMPLES OF BENEVOLENT TECHNOLOGIES FOR EMPATHIC NEIGHBOURHOODS

Urban AI (Quebec)

Urban AI offers a technology that applies artificial intelligence to the real-time monitoring and analysis of urban dynamics. Using sensors and cameras distributed throughout a city, Urban AI monitors aspects such as traffic, air quality and pedestrian behavior. This continuous monitoring enables problems to be identified quickly and urban interventions to be adjusted accordingly, promoting more agile and adaptable management of urban spaces.

Olivia (Quebec)

Olivia is an app developed to support residents' mental health by providing tools and resources for psychological well-being. Offering features such as virtual reality therapy, guided relaxation sessions and personalized counseling, Olivia aims to improve residents' quality of life by providing accessible and discreet emotional support. This approach fosters a healthier, more balanced environment in the neighbourhood.

EmoScienS (Quebec)

EmoScienS is a technology designed to support residents' mental health by helping them to better understand and manage their emotions. Through daily emotional monitoring tools, it helps to improve emotional intelligence and promote work-life balance. Respecting the highest ethical standards and guaranteeing data confidentiality, EmoScienS offers discreet, secure support. Integrated into a living environment, this technology contributes to strengthening community ties and fostering a caring environment, where mental health is a top priority. It also identifies residents' emotional needs, enabling local managers to adapt services and infrastructure in a more humane and empathic way.

Connecto (Quebec)

Connecto is a community relations management platform that facilitates interaction between residents and local authorities. Using online communication and collaboration tools, Connecto enables citizens to actively participate in the life of their neighbourhoods, submit proposals and monitor ongoing projects. By increasing transparency and participation, Connecto fosters stronger citizen involvement and better cooperation between the community and decision-makers.

Moment Factory (Quebec)

Moment Factory specializes in the creation of multimedia shows and interactive installations. By transforming public spaces through light projections, sound installations and immersive experiences, Moment Factory enriches the urban experience and reinforces the unique character of neighbourhoods. These artistic creations foster community engagement and add a cultural and aesthetic dimension to urban environments.

UGO (Quebec)

UGO is an interactive play module that merges the world of video games with traditional play structures, creating a unique outdoor play experience. This innovative device, developed by Go-Élan, integrates a screen, speakers and sensors, enabling children to take part in dynamic games while running, climbing and jumping. Thanks to an immersive multimedia interface, UGO offers solo or team games, enhanced by animated characters, lively music and audio encouragement. These interactive modules come in a variety of themes, making them easy to integrate into existing or new play areas.

Personal Alert Button (Singapore)

The Personal Alert Button (PAB) is a portable device that enables users to call for help at the touch of a button. The button can be used in an emergency to immediately alert emergency services or family members. It offers added security to residents, particularly the elderly or disabled, by providing a quick and efficient method of obtaining help in times of need.

Elderly Monitoring System (Singapore)

The Elderly Monitoring System is a technology dedicated to monitoring elderly people living alone. Using sensors and communication devices, this system tracks a person's daily activities and alerts caregivers or family members to any problems. This device helps to improve the safety of the elderly and offer peace of mind to loved ones, while promoting greater independence for the elderly.

The Sharing City Seoul (South Korea)

The Sharing City Seoul project is an initiative that encourages the sharing of resources within the city of Seoul. By facilitating access to shared goods and services, the project aims to promote a culture of collaboration and reduce individual costs. Residents can benefit from resources such as shared tools, vehicles or workspaces, while reinforcing a sense of community and supporting sustainable practices.

Lovot (Japan)

Lovot is a social robot designed to offer emotional interaction and support to residents. By mimicking affectionate behaviors and providing a warm presence, Lovot aims to improve the emotional well-being of individuals, especially those who feel isolated or lonely. This robot helps to create a more empathic and supportive atmosphere in neighbourhoods by offering companionship and comfort to residents.

Better Reykjavik (Iceland)

Better Reykjavik is an online consultation platform that enables citizens to propose, discuss and vote on ideas to improve their city. By facilitating residents' participation in decision-making processes, the platform helps local authorities identify community priorities and integrate citizens' suggestions into public policy. It thus fosters stronger citizen involvement and more responsive management of urban needs.

Smart Citizen Kit (European Community)

The Smart Citizen Kit is a set of tools enabling citizens to monitor various aspects of their environment, such as air quality, noise and weather conditions. By providing real-time data, the kit encourages residents to actively participate in the management of their neighbourhoods and report potential problems. Gathering this data also helps local authorities to better understand living conditions and implement more effective environmental policies.

Block by Block (UN-Habitat)

Block by Block is an initiative that uses augmented reality technologies to involve residents in the planning and improvement of their neighbourhoods. By enabling residents to visualize potential changes to their environment and actively participate in development decisions, the project promotes greater community involvement and ensures that any changes that are made truly meet residents' needs and desires.

APPENDIX 2
BIBLIOGRAPHY

BILORIA, N. “From Smart to Empathic Cities”, *Frontiers of Architectural Research*, volume 10, number 1, March 2021, pp. 3-16. Also available online: https://doi.org/10.1016/j.foar.2020.10.001.

BRUNO, I., DONARELLI, A., MARCHETTI, V., SCHIAVONE PANNI, A., VALENTE COVINO, B., LOBO, G. and MOLINARI, F. “Technology Readiness Revisited: A Proposal for Extending the Scope of Impact Assessment of European Public Services”, Conference Proceedings, [Online] 2019. [https://ec.europa.eu/isa2/sites/isa/files/technology_readiness_revisited_-_icegov2020.pdf] (Accessed March 25, 2024).

ELLYSON, C. and PLOUGANOU, M. “L’approche QIR: sortir des vases clos administratifs pour améliorer les quartiers montréalais”, *Urbanité, revue de l’Ordre des urbanistes du Québec*, Spring/Summer 2024. Also available online: https://ouq.qc.ca/revues/la-ruralite-reinventee/.

GOVERNMENT OF CANADA. “Disruptions on the horizon”, *Policy Horizon Canada*, [Online], 2024. [https://horizons.service.canada.ca/fr/2024/perturbations/index.shtml#report] (Accessed August 20, 2024).

A CITY FOR ALL WOMEN (IVTF). “Caring cities: prioritizing people from planning to policy”, [Online]. [https://www.cawi-ivtf.org/wp-content/uploads/2024/03/Caring-Cities-Final-French-without-marks.pdf] (Accessed September 3, 2024).

JACOBS, K. “Toronto wants to kill the smart city forever”, *MIT Technology Review*, [Online], June 29, 2022. [https://www.technologyreview.com/2022/06/29/1054005/toronto-kill-the-smart-city/] (Accessed September 13, 2024.)

KOSEKI, S., JAMESON, S., FARNADI, G., ROLNICK, D., RÉGIS, C., DENIS, J. L. “AI and Cities: Risks, Applications and Governance”, [Online], 2022. [https://unhabitat.org/sites/default/files/2022/10/artificial_intelligence_and_cities_risks_applications_and_governance.pdf] (Accessed August 20, 2024).

MONTGOMERY, C. “Happy City: Transforming Our Lives Through Urban Design”, New York. Farrard, Strauss and Giroux. 2013. 368 pages.

NUMANA. “Quebec government consultation report for the Green and Intelligent Building (GIB)”, [Online], 2021. [https://numana.tech/wp-content/uploads/2021/07/BVI-Rapport_Numana_Final.pdf] (Accessed October 4, 2024).

UN-HABITAT. “Draft resolution on international guidelines on people-centered smart cities”, [Online], 2023. [https://unhabitat.org/sites/default/files/2023/06/2310561f.pdf] (Accessed August 7, 2024).

PWC. “Cognitive Cities: A Journey to Intelligent Urbanism”, [Online], 2023. [https://www.pwc.com/m1/en/publications/documents/cognitive-cities-a-journey-to-intelligent-urbanism.pdf] (Accessed September 23, 2024).

RÉSEAU D’INNOVATION SOCIALE DU QUÉBEC (RQIS) “Schéma du cycle de vie d’une innovation sociale”, [Online], 2022. [https://www.rqis.org/wp-content/uploads/2022/01/Outils-evaluation-is-Schema-cycle-de-vie_VF.pdf] (Accessed October 4, 2024).

SAUNDERS, T. and BAECK, P. “Rethinking Smart Cities from the Ground Up”, [Online], 2015. [https://media.nesta.org.uk/documents/rethinking_smart_cities_from_the_ground_up_2015.pdf] (Accessed August 2, 2024).

UNIVERSITÉ DE MONTRÉAL. “Déclaration de Montréal IA responsable”, [Online], 2022. [https://declarationmontreal-iaresponsable.com/] (Accessed September 29, 2024).

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