



# NEXT-GENERATION CITIES INSTITUTE

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RESEARCH  
FOR  
CITIES  
OF  
THE  
FUTURE





## INDIGENOUS LAND ACKNOWLEDGEMENT

We, the Next-Generation Cities Institute, acknowledge that our working spaces are located on unceded Indigenous lands. The Kanien'kehá:ka Nation is recognized as the custodians of the lands and waters on which we are operating today. Tiohtià:ke, commonly known as Montréal, is the home to a diverse population of Indigenous and other peoples representing different cultures, languages, and worldviews. This vibrant urban environment is our home, where we all live, work, and hope the best for our future. We respect the continued connections with the past, present, and future in our ongoing relationships with Indigenous and other peoples within the Montreal community.

A key focus of the Next-Generation Cities Institute is on the challenges of our century, which demand human- and environmental-centred transdisciplinary and holistic urban concepts. We are aware that communities play an essential role in every aspect of our lives. True collaboration, co-creation, and participation aim to include all affected stakeholders and give them a voice in shaping the urban future. Historically, settler societies have neglected and attempted to erase and assimilate Indigenous cultures and identities through colonial frameworks. Until today, Indigenous communities continue to be excluded and under-represented in the planning and development of modern cities. Thus, it is crucial to include and actively engage with Indigenous voices, traditions, knowledge systems and practices to challenge the legacies of colonialism while fostering inclusive, ecological, and culturally vibrant spaces within our cities. Therefore, we affirm our commitment to engaging with and highlighting Indigenous and other stakeholder perspectives to develop a holistic vision of resilient, nature-based, next-generation cities, which are livable, sustainable, human-and environment centric, and socially just.

Having a sense of community unites us. As Next-Generation Cities Institute and Concordians, we believe that inclusive Next-Generation Cities can give us opportunities to connect with people, reach for our goals, and feel safe and secure in our future urban environment.

# NEXT-GENERATION CITIES AT CONCORDIA

**Concordia has emerged as a world leader in next-generation cities research and expertise. Our unique strength lies in our capacity to conduct high-impact research across engineering, the natural sciences, fine arts, design, the humanities and social sciences.**

The Next-Generation Cities Institute combines the knowledge and resources of 14 research centres in the study of cities. Concordia is Canada's first university to bring together such a broad interdisciplinary approach to cities research. This expertise led to Concordia winning a Canada Excellence Research Chair (CERC) — one of only nine awarded in 2019 — in Smart, Sustainable and Resilient Cities and Communities.

Our world-class researchers are exploring questions around sustainable development, zero-carbon cities and buildings, cybersecurity and artificial intelligence, the preservation of natural ecosystems and climate change, art-based urban interventions, transportation and mobility — and much more.

“Our public spaces are often sterile and congested with cars. We build brand new high-tech buildings where most people cannot afford to live. Neighbourhoods and cities of the future should be more than smart — they need to be places where people can live and thrive.”

— **URSULA EICKER**, Canada Research Chair in Smart, Sustainable and Resilient Communities and Cities



## WHAT IS A NEXT-GENERATION CITY?

Next-generation cities are inclusive, connected, collaborative, ecological, healthy, mobile, and encourage engagement to ensure that urban communities are empowered, resilient, prosperous and equitable.

**With the advent of smart cities, urban centres are increasingly connected, automated and interwoven with technology. The next generation city goes beyond the smart-city idea. It identifies and respects the needs of the next generations and empowers partnerships and co-creation processes to develop innovative human-and environment centred solutions for complex problems.**

The next-generation city not only optimizes its operational and sustainable goals, it also focuses on the quality of life of its inhabitants age, origin and the types of relationships they maintain with one another.

At Concordia, researchers focus on transforming and creating cities that are built for the next generation — cities that are sustainable and livable communities where people can thrive.

## WHY IS IT IMPORTANT?

Today, more than half of the world's population lives in cities, with an expected increase to 75 per cent by 2050. Cities are the most sustainable form of human development, the locus of innovation and productivity and the essential drivers for sustainable future development. The top 600 cities of the world hold 1.5 billion people — 22 per cent of world population — yet produce more than half of the world's gross domestic product.

However, cities face multiple challenges due to climate change, biodiversity loss and social disintegration. The UN's Sustainable Development Goals report that while cities occupy just three per cent of the Earth's land, they account for 60 to 80 per cent of energy consumption and 75 per cent of carbon emissions.

Cities have been hit especially hard during the COVID-19 pandemic, with deserted downtowns filled with empty office towers and shuttered shops and restaurants. Families and professionals with the financial means are migrating away from the city to the suburbs or the country. However, cities continue to be the most sustainable way of housing people, with a density that supports public transit and enables culture to flourish. Our research explores how to create healthy, green and inclusive communities that prevent unsustainable urban sprawl.

# EXPLORING INNOVATIVE SOLUTIONS

Next-generation cities research explores innovative solutions to these urgent issues to ensure a prosperous, inclusive, equitable and sustainable future. Here are some ways next-gen cities research can tackle these challenges.

- **Zero-energy buildings:** Reduce the environmental impact of buildings while enhancing their safety and comfort.
- **Smart, sustainable and resilient cities:** Develop urban-transformation strategies, renewable energy and resource efficiency measures and optimize the performance of municipal districts.
- **Sustainable water and energy systems:** Research new systems, technologies and solutions for water, energy and resource conservation.
- **The arts and humanities:** Explore ways the arts and humanities can enhance the positive social impact of next-gen cities to create a more inclusive, diverse and just society.
- **Cybersecurity:** Harness the power of digital communication, biometrics, network security, cryptography and cyber forensics to ensure a secure digital future.
- **Design practices and the built environment:** Study design projects and practices for the built environment situated at the crossroads of cultural, social, environmental and economic concerns.
- **Transdisciplinary approach to research and education:** Integrate the study of science, policy and values in the pursuit of environmental and community sustainability.
- **Innovative construction and infrastructure engineering:** Implement automation, robotics, Internet of Things, big data and industrialization to transform the construction industry.
- **Art Hives:** Connect small and regenerative community art studies to build solidarity across geographic distances.
- **Transportation and mobility:** Examine unique and expansive transportation and land-use data using cutting-edge tools for geographical analysis, transportation modelling and statistical analysis.



# NEXT-GENERATION CITIES INSTITUTE

Concordia's Next-Generation Cities Institute (NGCI) leverages the combined research strength of Concordia's cities research capacity to enhance collaboration, communication, education and community interaction.

The institute encompasses the full spectrum of next-generation cities research and brings together researchers from engineering, economics, the natural sciences, the arts, humanities and the social sciences to engage in an inclusive and systemic approach to sustainable urban development.

NGCI promotes interdisciplinary collaboration and facilitates training, consultancy, knowledge mobilization and outreach activities at Concordia. Intended to be flexible, agile, adaptive and responsive, the institute will serve as a model for international, publicly engaged research and learning. Placing existing inhabitants and their experiences at the heart of the institute's mission will ensure it becomes an ethical agora — a place where knowledge is co-created and shared.

“We aim to position design research for the sustainable city at the crossroads of creativity and critical thinking: establishing a matrix of innovation and civic engagement. We consider design as a platform for a better ‘collective making’ of the city.”

— CARMELA CUCUZZELLA, Associate Professor, Design and Computation Arts, Concordia University Research Chair in Integrated Design, Ecology, And Sustainability (IDEAS) for the Built Environment





## RESEARCH CENTRES

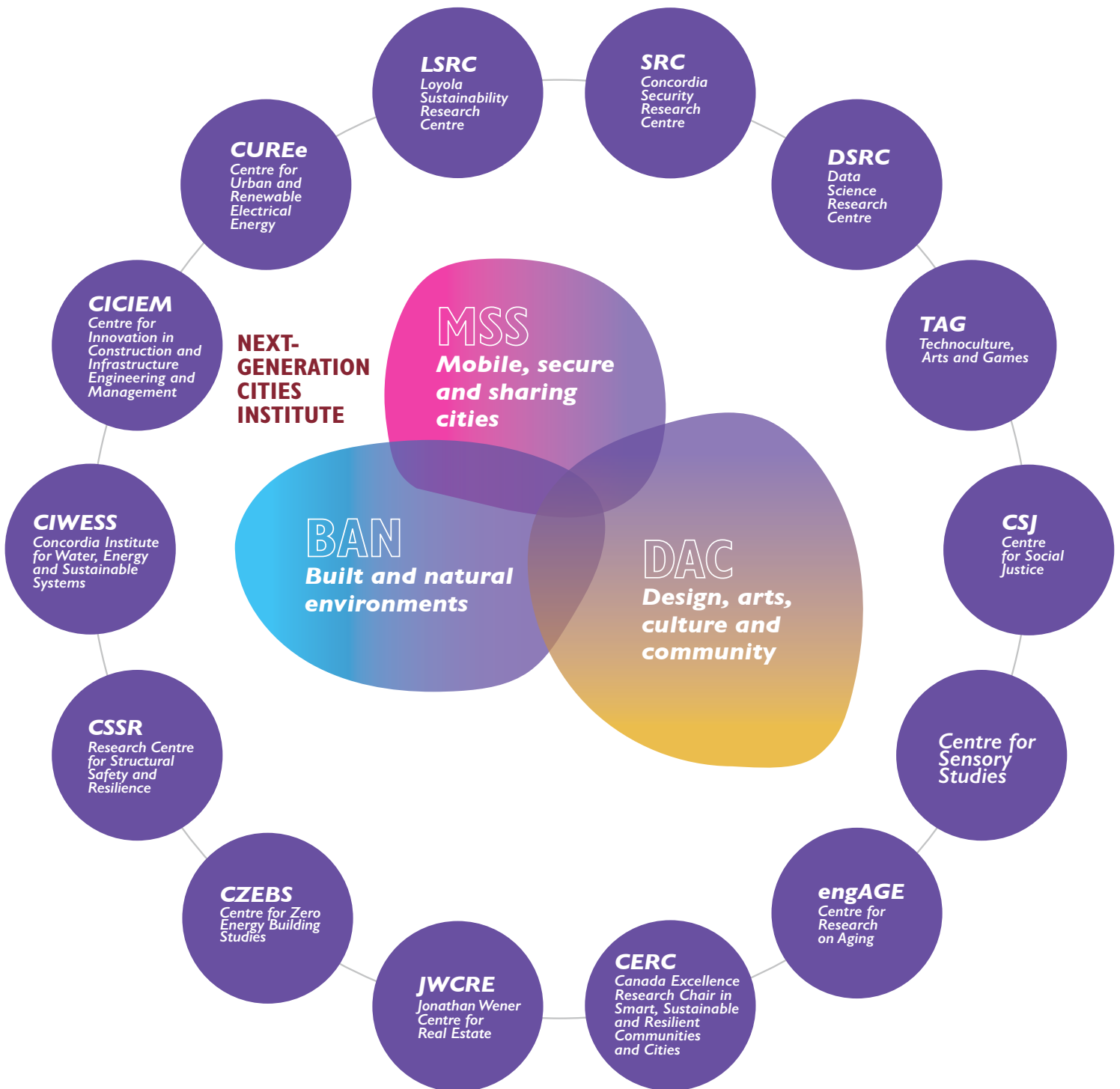
Concordia's 14 state-of-the-art university and faculty research centres combine the talents of more than 200 scientists, scholars, thinkers and creators from across our four faculties. The Cities Institute groups all academics into three research clusters that overlap, yet have distinct identities.

- 1. Built and natural environments (BAN) — the “hardware” of the city**
- 2. Mobile, secure and sharing cities (MSS) — the “software” of the city**
- 3. Design, art, culture and community (DAC) — the “soul” of the city**

Each cluster is overseen by two academics who are part of the Cities Institute Steering Committee. Each of the university's 14 cities research centres is represented in the Steering Committee, which guides the Next-Generation Cities Institute.

- **Centre for Innovation in Construction and Infrastructure Engineering and Management (CICIEM):** Concordia's flagship for construction automation and civil engineering provides solutions that improve safety, productivity and competitiveness in the construction industry.
- **Concordia Institute for Water, Energy and Sustainable Systems (CIWESS):** Trains students to be at the forefront of sustainable-development practices and studies sustainable ways to harness water and energy.
- **Research Centre for Structural Safety and Resilience (CSSR):** Leads interdisciplinary research in the areas of effective design, rehabilitation, monitoring and control of structures subjected to extreme loading events.
- **Centre for Zero Energy Building Studies (CZEBS):** Reduces the environmental impact of buildings while enhancing their safety and comfort by advancing knowledge through research, teaching students and assisting industry.
- **Jonathan Wener Centre for Real Estate (JWCRE):** Drives innovation through knowledge creation, training the next generation of real estate professionals and providing real estate leaders with insights into the evolving market and industry.







- **Loyola Sustainability Research Centre (LSRC):** Transdisciplinary approach to research and education on relationships among natural, human, and technological systems through basic and applied research, research creation, and art and design.
- **Security Research Centre (SRC):** Aims to bring together active and dynamic academic researchers, security practitioners, government and law-enforcement agencies, telecommunications companies, financial institutions and utilities to foster collaboration on critical infrastructure security, systems security and resilience, privacy protection and cyber forensics.
- **Data Science Research Centre (DSRC):** Promotes open data across the university community and to business and government.
- **Technological, Arts and Games (TAG):** Canada's largest and most established games research centre is a platform for interdisciplinary collaboration in digital game studies and design.
- **Centre for Sensory Studies:** Interdisciplinary platform for research in the social life and history of the senses, multisensory aesthetics, sensory design and marketing, and the development of technologies for expanding the sensorium in innovative ways.
- **Centre for Research on Aging/engAGE:** engAGE brings together researchers from a broad range of disciplines, from fine art to physics, to explore creative ways to study age and explore opportunities to enhance health and well-being.



- **Centre for Social Justice (CSJ)**: Fosters research excellence on social-justice issues and synergizes Concordia's extensive expertise in this area to further stimulate research and create collaborations at the university and beyond.
- **Canada Excellence Research Chair in Smart, Sustainable and Resilient Communities and Cities research unit (CERC)**: The Chair links different academic disciplines from the building, infrastructure, energy, biodiversity and transport sectors while bringing various urban stakeholders together to discuss urban development.
- **Centre for Urban and Renewable Electrical Energy (CUREe)**

“Concordia has the critical mass of expertise in sustainable and resilient civil-infrastructure systems. We want to be an agent of change that helps transfer the traditional construction industry into the digital age.”

— OSAMA MOSELHI, director, Centre for Innovation in Construction and Infrastructure Engineering and Management

## HIGH-IMPACT RESEARCH

- **A group of 30 students and 40 Concordia experts collaborated with the City of Lachine to transform the Lachine-East industrial site into a zero-carbon neighbourhood.** They developed concepts for efficient buildings, innovative waste-management systems, local renewable integration and public, active and shared transportation. A digital reproduction of the site was created for modelling and data analytics to find the optimum solutions.



- **Development of a digital platform that enables comparative analyses of public and active transportation systems for international cities** that have very different densities, layout and climatic conditions.
- **Concordia researchers created the smartphone application MTL Trajet** for the Ville de Montréal's annual smartphone travel survey, used to understand commuting patterns for transportation planning.
- **Concordia researchers teamed up with BusPas Inc. in Montreal** to develop a new micro transit demand management (microTDM) system. This system will help operate crowded transit systems more efficiently. It has the potential to revolutionize how transit systems are organized to provide better service to their users, at a lower cost.

- **To sprawl or not to sprawl: Envisioning urban development in Montreal for 2050 considering future generations and intergenerational justice is a project with researchers from four departments** (geography, philosophy, psychology and sustainability) who are exploring the implications of future urban sprawl on intergenerational justice, social development, quality of life and the environment.



“This project has the potential to change the way we plan our cities and to greatly improve the quality of life of current and future generations, as well as advance the fields of urban sustainability and intergenerational justice.”

— JOCHEN JAEGER, Associate Professor, Department of Geography, Planning and Environment



- **“FUTURE CITY PLAYGROUND” is a cutting-edge project introducing engaging gamification methodologies in the Institute’s transdisciplinary research.** The ambitious aim is to create an urban gamified simulation platform tailored to different stakeholders and their specific user experience needs. The immersive platform simulates data playfully and discovers the dependencies and consequences of alternative scenarios for tomorrow’s more sustainable and resilient cities while showing the dependencies and the results of user decisions. Another goal is for the UN SDGs to appear as a critical indicator and help educate and raise awareness about the crucial sustainable issues.

- **Participation in the renowned international C40 “Reinventing cities 2021” competition under the team name “TRANSITIONS.”** Co-creation of a concept for revitalizing and transforming a heritage industrial complex in a zero-carbon real-estate where innovation, accelerators, and circular economy meet to create green jobs and a resilience hub for south-west Montréal.
- **Study of the socio-environmental benefits of the deconstruction of the Champlain Bridge** and the impacts of repurposing its materials into new municipal infrastructure, urban interventions and public artworks.
- **Developing “intelligent clouds” and edge computing using artificial intelligence** to create infrastructure to support the Internet of Things and next-gen apps.
- **Launched Creative Living Lab in Cavendish Mall** to help combat social isolation among older adults and build inclusive communities across generations and cultures.
- **Study of how the design of urban public spaces can catalyze socio-cultural transformations** for improving environmental and social conditions in the city.
- **Collaboration with Bâtiment 7 to connect the university to community mobilization efforts and grassroots urban development** — everything from horizontal governance models to sustainable uses of former industrial spaces.



# PEOPLE



## Ursula Eicker

- Founding Co-Director
- Professor, Building, Civil, and Environmental Engineering
- Canada Excellence Research Chair (CERC) in Smart, Sustainable and Resilient Communities and Cities

*"Next-gen cities are built with a life-cycle approach, where resource use follows circular economy principles, where all energy is produced by renewables and where urban dwellers meet and create culture."*



## Carmela Cucuzzella

- Founding Co-Director
- Associate Professor, Design and Computation Arts
- Concordia University Research Chair in Integrated Design, Ecology and Sustainability (IDEAS) for the Built Environment

*"Next-generation cities are about urban resilience, not only through technological or built environmental developments but also through community cohesion and cultural diversity."*



## Michael Bossert

- Manager, Research Innovation and Business Development

*"The ability to innovate decides our future, and innovative capability starts in the mind — with our attitude. Next-generation cities need catalysts and decision-makers who are equipped with an open ear, a playful mind, critical thinking skills, curiosity, and the ability to master complex challenges in a collaborative way. With the Next-Generation Cities Institute, we created a space where persons of all ages and backgrounds can co-create the future."*



## Ivona Bossert

- Knowledge Mobilization Advisor

*"As a designer, I recognize the need to rethink public spaces and look at them from the unique perspective of their users. Understanding different behaviours and lifestyles will allow us to create accessible, inclusive and pleasant multi-generational next-generation urban experiences."*



## Christopher Gibbs

- Senior Advisor, Urban Simulation Platform and Gamification

*"By visualizing Next Generation Cities and allowing you to play with them in real-time, we expand the reach of our research: empowering smarter decisions and educating greener behaviours."*

Time is the forgotten dimension of the city. We focus so much in the material and spatial dimensions of the city that we forget about its impermanent state. The city is a work in progress, and therefore, it is in a perpetual state of becoming. When we plan cities, we need to consider that everything has an expiration date. That might seem pessimistic at first sight, but quite the contrary. It entails that there are always opportunities and potential for profound urban transformation in which the citizens can be the protagonists.

— SILVANO DE LA LATTA, Assistant Professor, Geography, Planning and Environment





### **Pierre Gauthier**

- Cluster Co-Director, Built and Natural Environments
- Associate Professor, Geography, Planning and Environment

*“A next-gen city is a city that cares and nurtures. A next-gen city mobilizes its ingenuity, collaborative skills and willpower to create nurturing buildings, infrastructures and public places and spaces that are also spaces of citizenship.”*



### **Erkan Yönder**

- Cluster Co-Director, Built and Natural Environments
- Assistant Professor, Finance

*“Next-generation cities will have smart buildings and infrastructure measuring environmental and social footprints; and develop communities being aware of environmental and social impacts. Lowering carbon emissions and climate impacts continuously, healthy buildings, and inclusive societies are some examples of the priorities of the next-generation cities.”*



### **Janis Timm-Bottos**

- Cluster Co-Director, Design, Arts, Culture and Community
- Associate Professor, Art Therapy, Creative Arts Therapies
- Provost Fellow for Community Engagement, Fine Arts

*“The city of the future values beauty of the everyday through diversity of people and their contributions and offers welcoming places and green spaces for spontaneous, creative community engagement to achieve a greater good.”*



### **Meghan Joy**

- Cluster Co-Director, Design, Arts, Culture and Community
- Assistant Professor, Political Science

*“I envision an urban future in which local governments are important political actors and serve its diverse population’s social, political, and economic needs. This requires new forms of local governance, new revenue and policy tools, new policy visions and action plans, new forms of intergovernmental coordination and new participatory mechanisms.”*



### **Govind Gopakumar**

- Cluster Co-Director, Mobile, Secure and Sharing Cities
- Associate Professor and Chair, Centre for Engineering in Society

*“Transformative pathways that will address systemic lock-ins and barriers are the way forward to achieve the goal of sustainable, equitable and resilient next-generation cities.”*



### **Chun Wang**

- Cluster Co-Director, Mobile, Secure and Sharing Cities
- Professor, Concordia Institute for Information Systems Engineering (CIISE)

*“Next-generation cities pursue a citizen-focused approach which leverages smart, integrated, and optimized services enabled by innovative technologies to improve citizens’ welfare and foster economic growth.”*

## **AN INSTITUTE LIKE NO OTHER**

**The strength of the Next-Generation Cities Institute (NGCI) lies in our capacity to conduct high-impact research/creation combining engineering, fine arts and design, economics, health and social sciences. NGCI is unique in Quebec and Canada for the depth and scope of its cities research and the range of expertise that it assembles under a single umbrella.**

Located in the heart of Montreal, a vibrant, multicultural city with a strong social consciousness, the institute is well positioned to engage with the city, its communities and inhabitants. As a trusted anchor institution in Montreal, Concordia has great capacity to support NGCI’s role as a broker of knowledge between academia, industry, municipalities, and citizens and communities.

In short, by harnessing the full spectrum of next-generation cities research and using a holistic approach to transform cities into sustainable, resilient and inclusive communities, NGCI creates lasting and meaningful change in urban communities around the world.



Get in touch with the Next-Generation Cities Institute:

- [concordia.ca/research/cities-institute.html](https://concordia.ca/research/cities-institute.html)
- [nextgencities@concordia.ca](mailto:nextgencities@concordia.ca)

Learn how you can support the next generation of Concordia students.  
Contact our development staff at 514-848-2424, ext. 4856.

Share your **#CUpride** and **#CUalumni** stories via **@ConcordiaAlumni**.



[concordia.ca/campaign](https://concordia.ca/campaign)

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