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.

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 engages with the smart-city idea and asks the question, “Who is the city built for?”

The next-generation city not only optimizes its operational and sustainable goals, it also focuses on the quality of life of its inhabitants 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 CUCUTZIELLA, 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 politics and experience 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.

NEXT-GEN CITIES INSTITUTE
• **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 Oral History and Digital Storytelling (COHDS):** Community of more than 300 individual and institutional affiliates specializing in history, sociology, communications, museology, arts, theatre and anthropology.

• **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.

• **Institute for Urban Futures (IUF):** Amplifies, initiates and cultivates research and research creation projects that directly connect students, faculty and researchers with a diversity of questions regarding the future of cities.

“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.

• 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.

• La Ville Extraordinaire is an interdisciplinary research project that mobilizes the urban knowledge of older Montrealers through oral history and place-based creation in community partnership with four distinct groups of older Montrealers.

• Using three-dimensional models of the city, researchers are examining various transformation scenarios towards zero carbon. Powerful visuals and interactive games provide researchers with easy access to complex engineering models.

• 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 JAEGEL, Associate Professor, Department of Geography, Planning and Environment
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. 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.

“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.”

“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.”

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

“My next-generation city includes and provides a platform for the well-being and creativity of all generations and ages, from the wide variety of walks of life.”

“We have to allow cities to reach their potential sustainability and prosperity.”

“What does your urban future include? What do we need to be able to imagine, through our research and research creation projects, for possible urban futures that are radically inclusive, just, resilient and sustainable?”

— SHAUNA JANSEN, BFA 94, MA 09, PhD 14, Director, Institute for Urban Futures, Concordia University Research Chair in Performative Urbanism
Get in touch with the Next-Generation Cities Institute:
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Learn how you can support the next generation of Concordia students.
Contact our development staff at 514-848-2424, ext. 4856.
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concordia.ca/campaign