SMART CITIES
TAMING MICROCLIMATE

Redefining possible.

November 2018 MEA Annual Fall Workshop

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MUNICIPAL ENGINEERS ASSOCIATION

Topics

RWDI – Who we are

Sidewalk Labs Project

RWDI & Sidewalk Toronto

Taming the microclimate

Thoughts for your municipality

RWDI – Consulting Engineers & Scientists

500 + employees
Global
Canadian

Global Experience

A Global Presence

Our Vision

Redefining Possible

3 Practice Areas:

Buildings
Industry
Infrastructure

Buildings

Wind loads

Aerodynamic Shaping

Supplementary Damping Systems

Stack Effect

Pedestrian Safety & Comfort

Building Enclosure

Glare

Jeddah Tower, Saudi Arabia; Burj Khalifa, UAE; Ping An Finance Centre, China; Lotte World Tower, South Korea

Industry

Air Quality

Ventilation

Noise

Geoscience

Waste Management

Occupational Health

On-site Monitoring

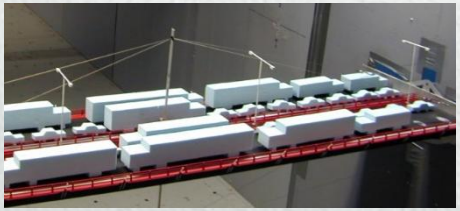
Infrastructure

- **Wind loads**
- **Pedestrian Comfort & Safety**
- **Air Quality**
- **Acoustics**
- **Noise**
- **Vibration**
- **Energy Modeling**
- **Solar Impacts**
- **Building Enclosure**
- **Snow & Ice**
- **Weather forecasting**
- **Sustainability**
- **Resiliency**
- **Damping Systems**

Tacoma Narrows Bridge, USA

Metrolinx, Union Station Toronto

Airport Control Tower, India



Snow, Ice Accretion, Rollover Studies

Airport Thailand

Masterplans

Wind loads

Energy Modelling

Sustainability

Commissioning

Pedestrian Comfort & Safety

Solar Impacts

Ventilation

Waste Management

King Abdullah City for Atomic and Renewable Energy, Saudi Arabia; MASDAR, UAE

Smart Cities

Sidewalk Labs Project

Smart Cities

Urban Area

Electronic data collection

citizens, devices, and assets

Data processed and analyzed

Manage assets

Manage systems

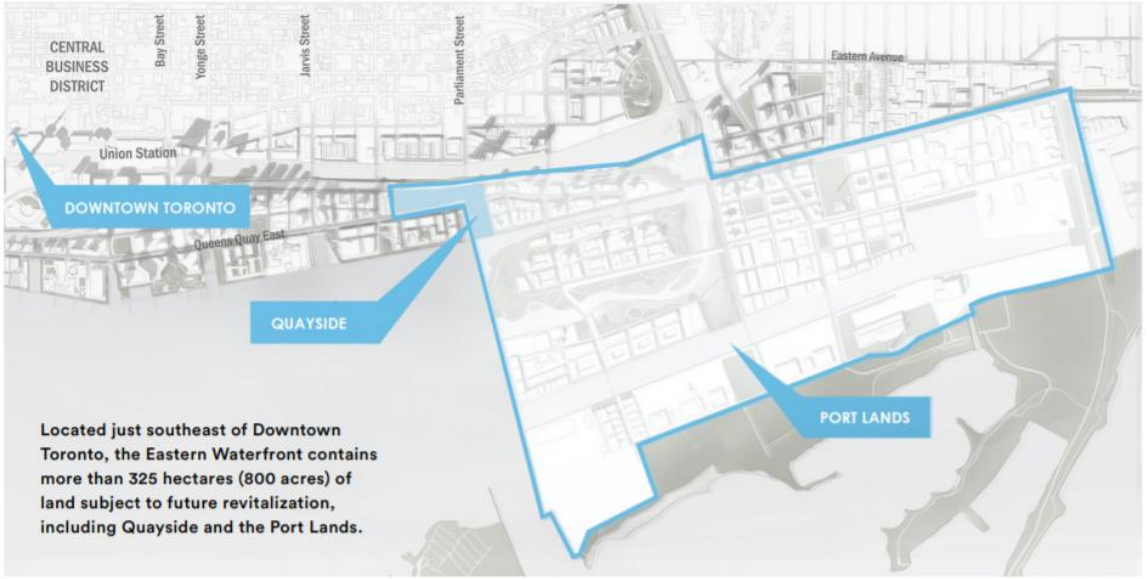
Integration – ICT IoT

Improve urban environment

People

Sidewalk Toronto

Sidewalk Labs & Waterfront Toronto Develop 12-acre Quayside



North America's largest example of a "smart city"

Sidewalk Toronto - Before

Sidewalk Toronto – After – Vision

A public realm that puts people first and is vibrant year-round.

RWDI & Sidewalk Labs

Working together since Feb 2018

New neighbourhood - Quayside

Public consultation

Demonstrations & prototypes

Ongoing project

RWDI Scope has expanded

A person walks down a snowy street in Toronto. (Image: Unsplash user LinedPhoto)

M | SIDEWALK TALK

Sidewalk Toronto – Goals

Public Realm Objectives

SIDEWALK TORONTO

MORE TIME SPENT OUTDOORS, TOGETHER

Foster happy and healthier communities through a vibrant, porous public realm that gives people new levels of agency over their environment

MORE COMMUNITY SPACE

Create a public realm network that gives everyone convenient access to green spaces and shared amenities

MORE USES

Expand what's possible for all ages and abilities on water and land

MORE HOURS, MORE SEASONS

Create flexible infrastructure that keeps the public realm vibrant

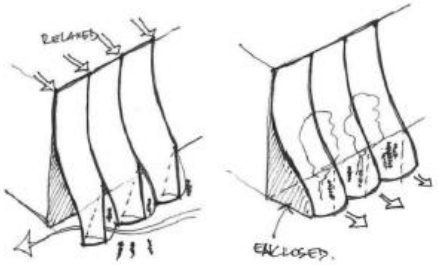
MORE COMMUNITY EMPOWERMENT

Welcome and empower a diverse community of residents, Torontonians, and visitors from all walks of life

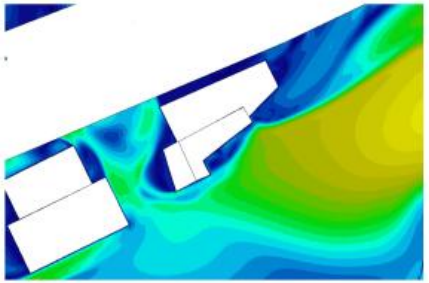
Sidewalk Toronto – Microclimate Goals

We are developing a microclimate system that makes the outdoors usable year-round

Goal: Double Toronto's usable outdoor hours

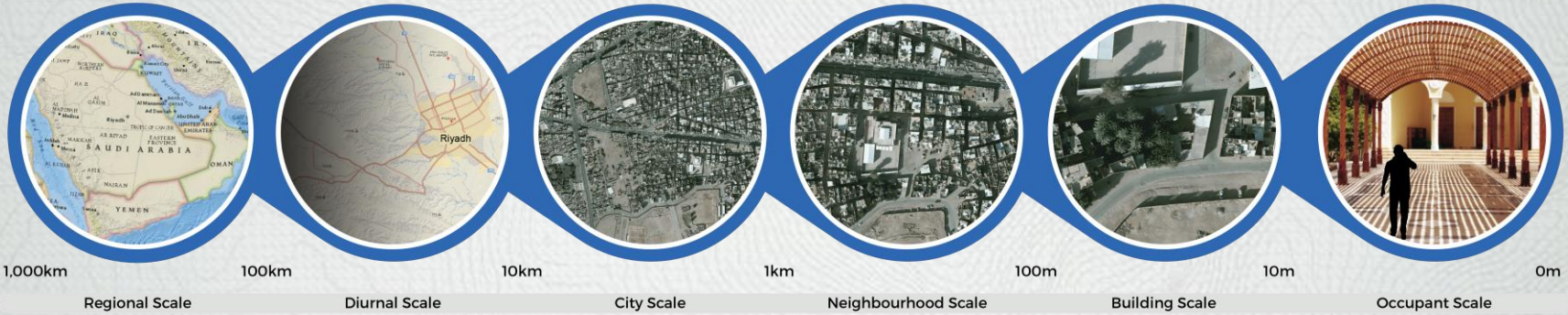


1. Develop an adaptable, low cost 'kit of parts'



2. Respond to real world weather data

Microclimate - Meteorology & Climate Analysis



Detailed site-specific climate analysis

From a regional to occupant scale.

Improving Pedestrian Comfort

Thermal Comfort

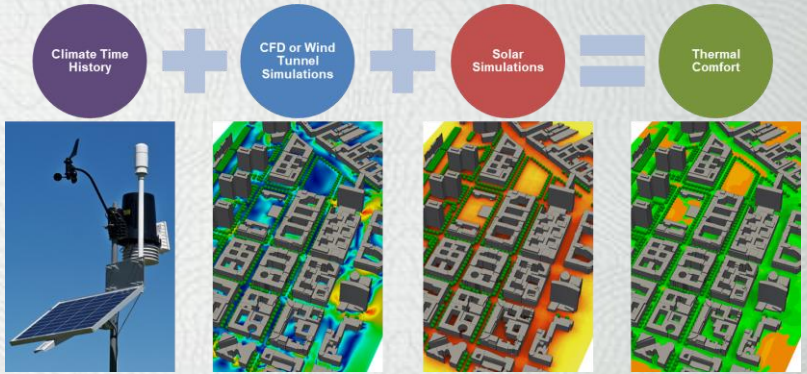
- Temperature & Wind

Microclimate

- How buildings change incoming wind & sun?
- How structures impact local conditions?

Work with Planners, Architects

- Iterate through designs for places & buildings
- Leverage computational tools
- Quantify results



RWDI Process

Select 8-10 programs for the site

Establish a tool kit

Baseline condition assessment

Establish sensor data parameter requirements

Draft a standard

Select & Refine Mitigation measures

Measure

Verify –Compare monitored results to predicted

Final standard

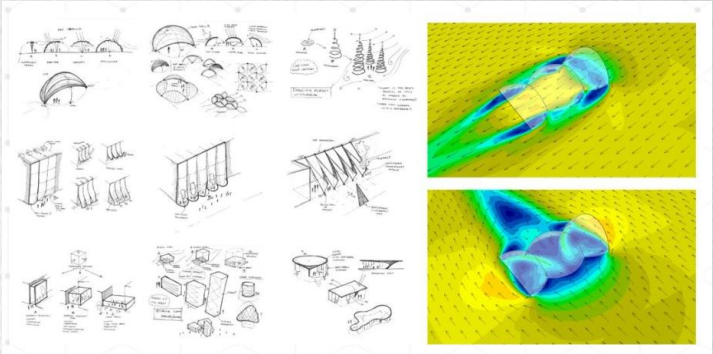
RWDI – Sidewalk Toronto So Far

Designed weather mitigation systems

Validated wind & solar systems using CFD

Inform quantitively about designs

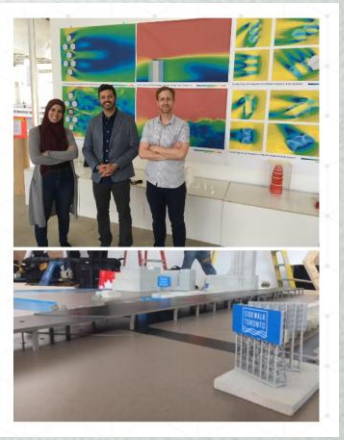
Mitigation by passive means



Deploying & testing prototypes

Wind tunnel and flume testing

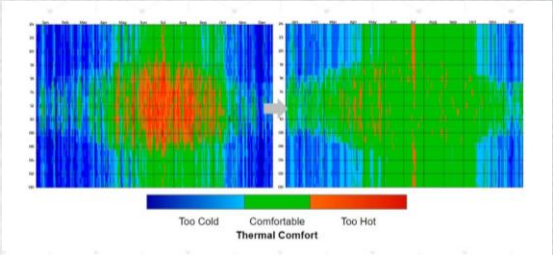
Discussion & Demonstration at



RWDI – Sidewalk Toronto Results

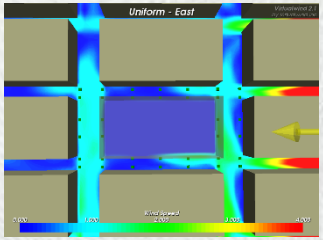
Achievement of thermal comfort goals

Estimate we can more than double of comfortable daytime hours in the district

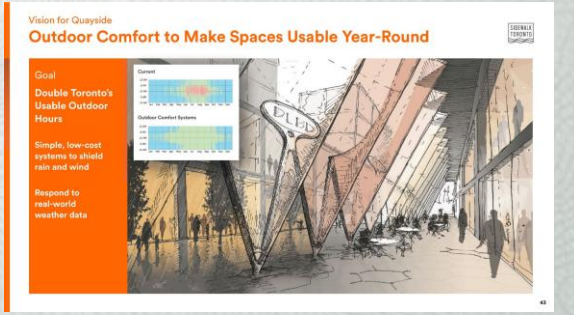


Provide useful design information

Massing, orientation & street grid



Help develop a “building raincoat”



RWDI Focus Areas

Outdoor Comfort

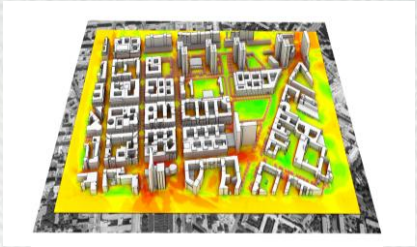
Wind & thermal

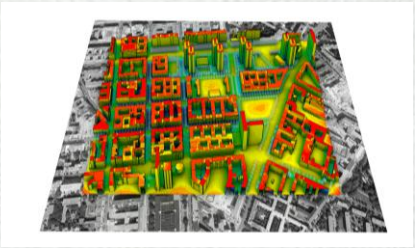
Masterplan Consulting

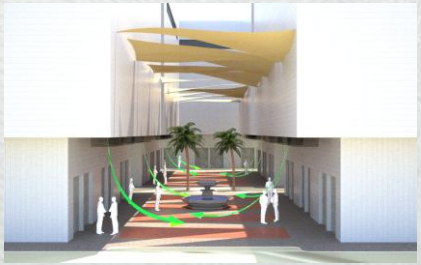
Quayside, Keating, Villers Island

Acoustics, Noise & Vibration

Indoor & outdoor







Smart Cities

Learning Applied to our Cities

Municipal Urban Environment

Plan proactively

Not case by case due to development

Design for safe & comfortable outdoors

- **cycling paths**
- **walkable communities**
- **meeting places**

CFD simulation of London, UK microclimate 2016

Microclimate is unique, important & can be tamed in each city

Canadian Municipalities

Drive economic development

- **More people, densification**

Brownfields

- **every city has some**

Cultural programs

- **Indoor & outdoor**
- **Meeting places**
- **Theatre & Arts**

Pedestrian comfort is paramount

SMART CITIES TAMING MICROCLIMATE

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