RESILIENT URBAN MOBILITY IN TORONTO: BRINGING LOCAL IMPLEMENTATION TO GLOBAL PRACTICE

DR. ALEXANDER MIRESCU
HEAD, URBAN RESILIENCE BUSINESS UNIT AT PONTAROLO ENGINEERING (CANADA)
PROMOTOR – UNITED NATIONS “MAKING CITIES RESILIENT CAMPAIGN”
What is Urban Resilience?
What is Urban Resilience?

- **Risk**: The combination of the probability of a hazardous event and its consequences which result from interaction(s) between natural or man-made hazard(s), vulnerability, exposure and capacity.

- **Hazard + Exposure + Vulnerability = Risk**

- **RESILIENCE**: The ability of a urban system, community or society exposed to hazards to **RESIST, ABSORB, RECOVER** from the effects of a hazard in a timely and efficient manner, and **EVOLVE** to adapt to future challenges.
What Drives Risk? Underlying Risk Drivers

- Badly planned and managed urban development
- Environmental degradation and ecosystem decline
- Poverty and inequality
- Vulnerable livelihoods
- Climate change
- Weak governance/Lack of resilience-based governance
- Knowledge gaps
- Exclusion of key sectors, like transportation, the private sector

By mid-century, 70% of humans will live in urban areas.
Cities will need to host 3 billion additional inhabitants by 2050.
Climate Change and Disaster Loss

- According to Aon Benfield’s “Weather, Climate and Catastrophe Insight – Annual Report 2017”, 2017 was the costliest year on record for weather disasters.
- 2017 had a total economic cost of USD 353 billion and insured losses of USD 134 billion.
- Over 80% of disaster losses are hydrological – typhoons, hurricanes, coastal and riverine flooding.
Why engage in DRR and resilience?

Aside from human losses, which are going down, spiraling economic losses are inspiring national governments, municipal leaders, the private sector and civic society stakeholders to better understand the benefits of DRR and resilience.

Economic losses from disasters such as earthquakes, tsunamis, cyclones and flooding are now reaching an average of US$250 billion to US$300 billion each year for all hazards.

Future losses (expected annual losses) are now estimated at US$314 billion as a result of earthquakes, tsunamis, cyclones, and flooding in the built environment alone.

![Diagram showing the relationship between direct and indirect, quantifiable and non-quantifiable losses.]

- Direct:
  - Destruction of a site of cultural significance
  - Property damage

- Indirect:
  - Lost education
  - Business interruption and lost income

- Quantifiable:
  - Measured numerically (e.g., monetary terms)

- Non-quantifiable:
  - Difficult to assign a monetary value
Cities have neglected to understand the relationship between urban mobility and urban resilience.

Urban infrastructure (drainage, roads, transportation) accounts for the vast majority of costs for adapting to climate change.

Costs: Maintenance, repair, reconstruction, disruption and social/community losses to cities.

No matter how you look at it, urban resilience makes good financial sense:

Every 1 USD invested in resilience and disaster risk reduction corresponds to approximately 7 USD in response, reconstruction and recovery costs.
Making Cities More Resilient Through Resiliently-Designed Transportation

- According to the World Bank’s “Moving Toward Climate-Resilient Transport:”

“Countries are investing massively in transport infrastructure and such spending is likely to rise to meet aspirations from greater mobility and connectivity. Growing climate risks will impact the entire transport value chain. These risks raise the question of whether, and by how much, new or existing transport infrastructure”

- Since cities, national governments and metropolitan areas spent so much of their municipal budgets on transportation, we need to consider integrating resilient design not only to protect that investment, but to bring risk reduction and resilient throughout the city.

<table>
<thead>
<tr>
<th>City</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>49.5m</td>
</tr>
<tr>
<td>San Fran</td>
<td>126m</td>
</tr>
<tr>
<td>Istanbul</td>
<td>600m</td>
</tr>
</tbody>
</table>
Successful Implementation of Resilient Transportation Toronto
Waterloo Light Rail Train Streetscapes
Waterloo Light Rail Train
Streetscapes
VIVA Bus Rapid Transit in York Region of Northern Toronto
Subterranean Flood Water Capture: Keeping Risk from VIVA BRT Infrastructure
Subterranean Flood Water Capture: Keeping Risk from VIVA BRT Infrastructure
Subterranean Flood Water Capture: VIVA BRT Infrastructure
Conclusion: Designing Resilient Transportation for Resilient Cities