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"Building climate resilient cities:
Exploring theories, practices and prospects in India"
Student Seminar, TERI University, New Delhi, 16 February, 2015

# Climate Change and Urban Resilience:

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Monday, 16th February 2015 www.unhabitat.org

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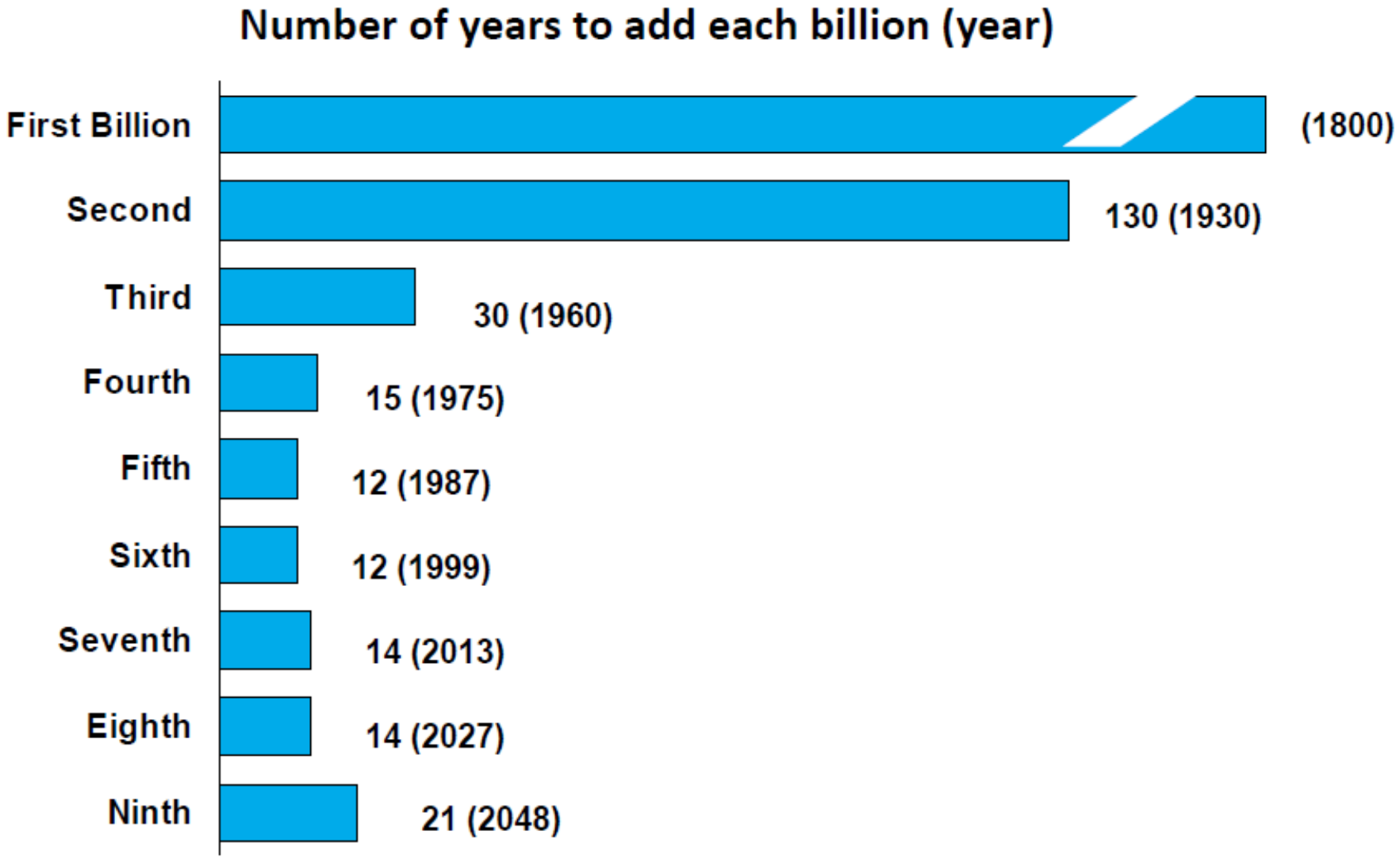
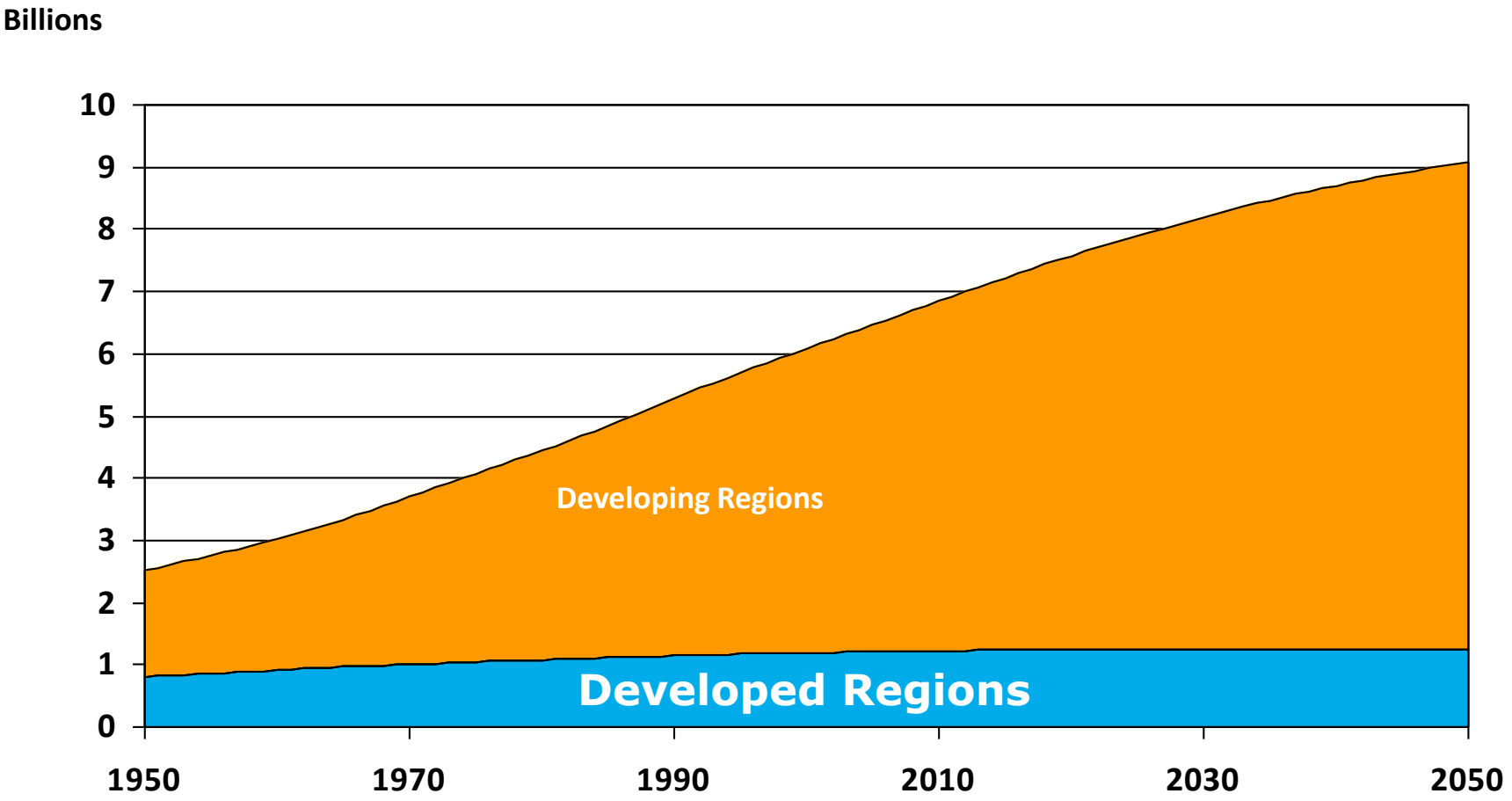
# World Population Growth (in billion)



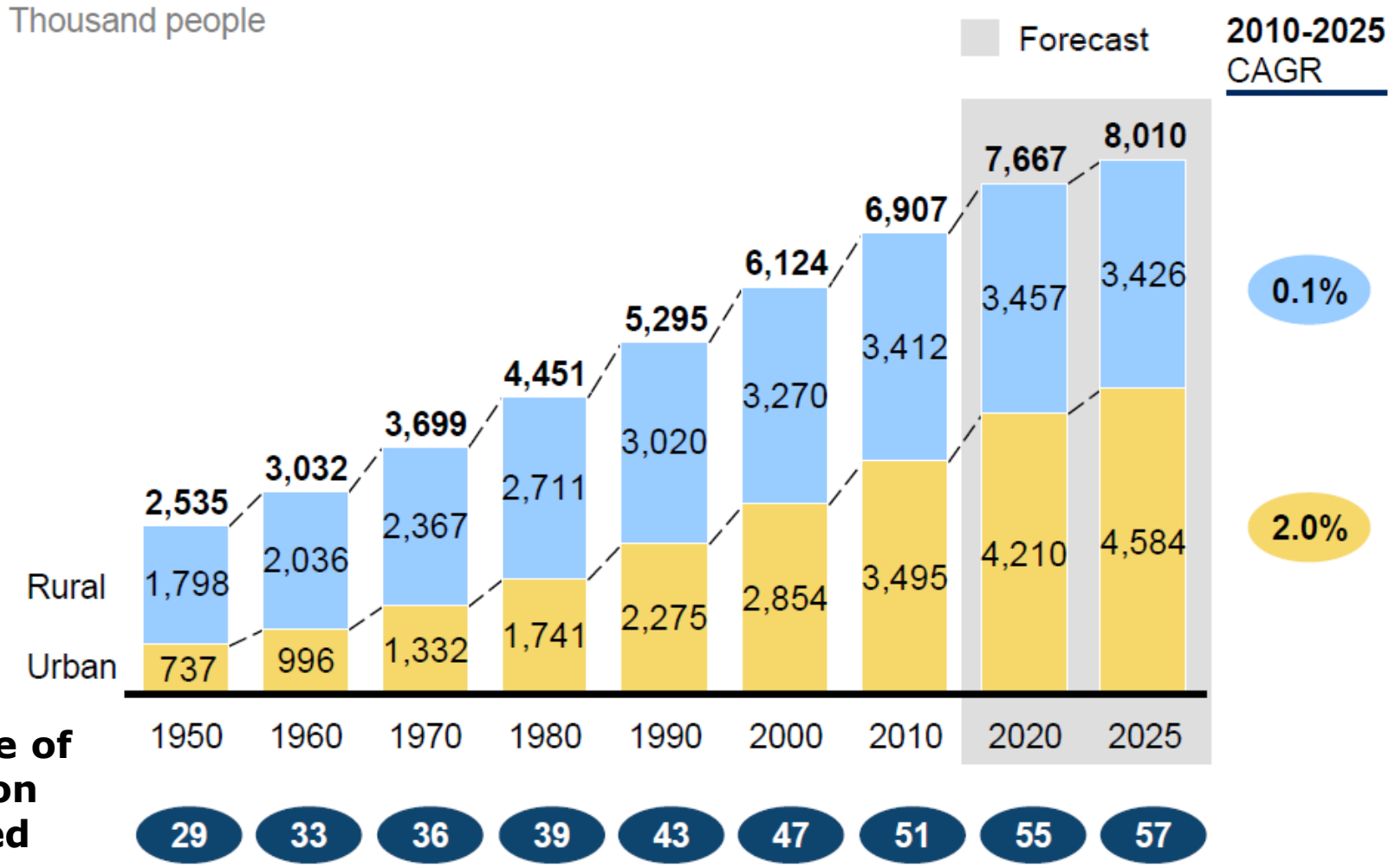
# Urbanization is growing really fast, more than population




Source: UN

# Worldwide, urban populations are growing 20 x faster; 57% of world's population will be in urban areas by 2025

## Share of urbanized population over total population



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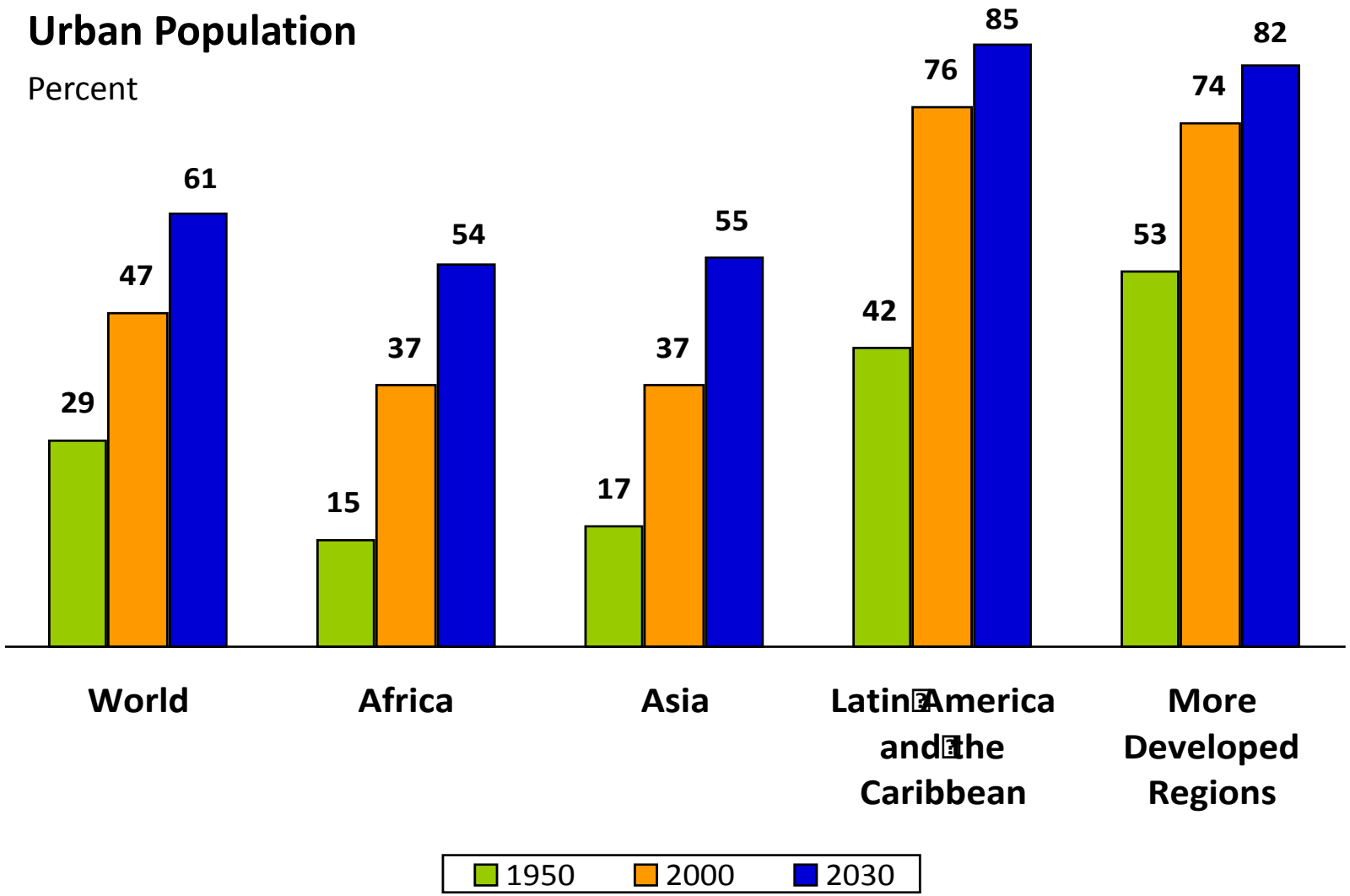
# Regional character of Urbanization




Source: UN

# Twenty First Century- Century of Cities

**"Cities have become the dominant global human habitat of this century in terms of geography, experience, constituency and influence"**

**Morgon Grove - Cities: Managing Densely Settled Social Ecological Systems 2008**

# Concurrent trends & different urban impacts

**There are 3 concurrent changes with long term and deep impacts:**

- Differential Impact of Climate Change
- Differential Impact of Growing and Ageing
- Differential Impact of Urbanization on Economies

## Developed World (more than 30,000 USD per capita)

- Climate change: Cities are sources of high level emission of CO2
- Demographic Shift: Aging population Growing cost of old age services
- Growing inequality: Growing youth unemployment Financial crisis of the welfare services

## Developing World (less than 1,000 USD per capita)

- Climate change: Highest impact due to climate change in vulnerable and poor cities (floods, droughts, famines…)
- Demographic shift: A growing youth population, potential economic asset but challenging unemployment of urban youth. High rates of urbanization with low level industrialization
- And endemic urban poverty: Manifested as slum formation and resort to informal low value

# India is key to achieving global environmental and energy goals

**India's 12th Five Year Plan commits to environmental sustainability as a headline goal**

- India is the fourth largest GHG emitter, responsible for 5.3% of global emissions
- India has committed to reduce the emissions intensity of its GDP by 20 to 25% by 2020
- India has 8% of the world's biodiversity with many species that are not found anywhere else in the world
- India is among the early movers on the Nagoya protocol and is committed to the Aichi targets on conserving biodiversity
- In 2010, per capita annual electricity consumption was 626 kwH compared to the global average of 2977 kwH
- Over 350 million Indians are unconnected to the electricity grid
- Sustainable Energy for All can achieve its targets only if there is ambitious action in India

# India’s growth rate is threatened by environmental sustainability

**Because of their dependence on agriculture and forests, environmental degradation hits the poor the hardest**

- Although India has 18% of the world's population, it has only 4% of global water resources
- 60% of India’s blocks face acute crises in terms of groundwater quantity and quality
- Most major Indian rivers are highly polluted and most peninsular rivers flow for a very short season
- 90% of waste water discharged in rivers does not meet environmental norms
- 65% of rainwater goes into the sea, a major wastage
- Forests constitute 21% of India’s land; 40% of all forests are degraded
- The North East hosts 52% of India’s plant species with 7000 endemic plants; the region is highly impacted by deforestation and erosion
- Most of India’s coal lies under rich forests and ecologically sensitive regions
- Climate change is expected to make the Indian monsoon more unpredictable with negative impact on agriculture

# Fifty percent of India's population will live in urban areas by 2050

**The new government has announced plans to build 100 smart cities**

- By 2050, India's urban dwellers are expected to increase by 404 million
- By 2030, India is expected to be home to 6 mega-cities with populations above 10 million
- With a fourth of India residing in urban slums, urban infrastructure can not keep pace with usage; half of all urban areas do not have sewage treatment facilities and only 6 percent of cities and towns have a public transport system
- A recent Report by McKinsey estimates that by 2013, 70% of new jobs in India will be in the cities and 91 million urban households will be middle class as compared to the current 22 million

# The Himalayan Ecosystem is the richest but the most vulnerable in Asia; its degradation will impact the rest of the world

**The Himalayan Ecosystem is the highest mountain system in the world with the third largest global reserve of freshwater**

- The Himalayan Ecosystem is the source of ten major rivers; it provides freshwater to 25 percent of mankind and direct livelihoods for 200 million people
- Half of India's plant species and two of the world's 34 biodiversity hotspots are located in the region
- Increased temperatures and changing ecosystems due to climate change are putting habitats and livelihoods at high risk; an estimated 1.3 billion people are likely to be impacted by flooding and water scarcity in the region
- Climate-related changes are expected to accelerate biodiversity loss and deforestation and increase vulnerability to natural disasters
- By 2030, surface temperatures are projected to increase by two degrees, annual rainfall by 6-8 percent and rain intensity by 1-6 millimeters per day; experts also predict a drop of between 1-10 rainy days per year and a 40 percent decrease in maize yields

# ADDRESSING URBAN ISSUES IN NATIONAL CLIMATE CHANGE POLICIES

## CLIMATE CHANGE ADAPTATION AND RESILIENCE

- Prohibit new development in areas subject to high risk of natural disasters.
- Consider reflecting risks that will increase with climate change in urban land use plans.
- Improve standard building codes and regulations by incorporating broadly applicable resilience considerations (including climate resilience).
- Prioritize investments in systems that reduce the risks of natural disasters faced by human settlements.
- Pay specific attention to the needs of the most vulnerable groups in developing responses to climate change.
- Encourage urban agriculture through land use planning and complementary programmes.
- Harmonize policies that address climate change adaptation with other relevant policies

# MITIGATION OF GREENHOUSE GAS EMISSIONS

- Promote low carbon mobility
- Reduce the production of solid waste, and improve municipal solid waste management to reduce greenhouse gas emissions.
- Promote energy- and resource-efficient buildings and human settlements
- (a) Promote the development of compact urban forms while providing for adequate service provision. (b) Relate spatial development patterns to transportation networks in a coherent way.
- Encourage local authorities to adopt low emission urban development strategies and plans.
- Encourage city dwellers to reduce their carbon footprints through public awareness campaigns.

# Addressing Climate Change: Role of ULBs

- Local authorities can help national governments to implement policies and achieve targets for addressing climate change.
- Vertically integrate local authorities' initiatives into nationally led efforts.
- Minimize the administrative burden imposed on local authorities by new climate change related mandates.
- When appropriate, differentiate responsibility by different categories of local authority.
- Provide adequate resources to local authorities to support new mandates.
- Provide an adequate enabling environment for local authorities to take action.

# City of Toronto – Serene, Beautiful City of Canada

# December 2013 Ice-Storm Impact on Toronto

# Making Cities Resilient – Citizens' Role

- **Resilience is ability to recover readily from adversity**

- **Climate Change is not about things becoming warmer. It means becoming more volatile.**

**CLIMATE CHANGE = VOLATILITY**

**RESILIENCE = HEDGING VOLATILITY**

# Climate Change - a Business Management Problem

***For Example:***

- ***In the past Toronto had 20 hot days per year***
- ***As a result of the Climate Change, hot days in Toronto will treble by 2030***
- ***This means in Toronto there shall be 60 hot days per year in 2030***
- ***Yet today Toronto's buildings are being constructed for yesterday's climate***
- ***With the increase in number of hot days in a year, the electricity demand will have higher and higher peaks.***

***10% Peak = 40% of Cost***

- ***Weather will become more and more extreme resulting in more inches of rainfall in 24 hr period.***

# Climate Change Impact on Electricity Demand

# Climate Change Impact on Weather

# Peak Rainfall can have a huge cost

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## Toronto floods leave power system 'hanging by a thread'

**Some 16,000 people still without power**

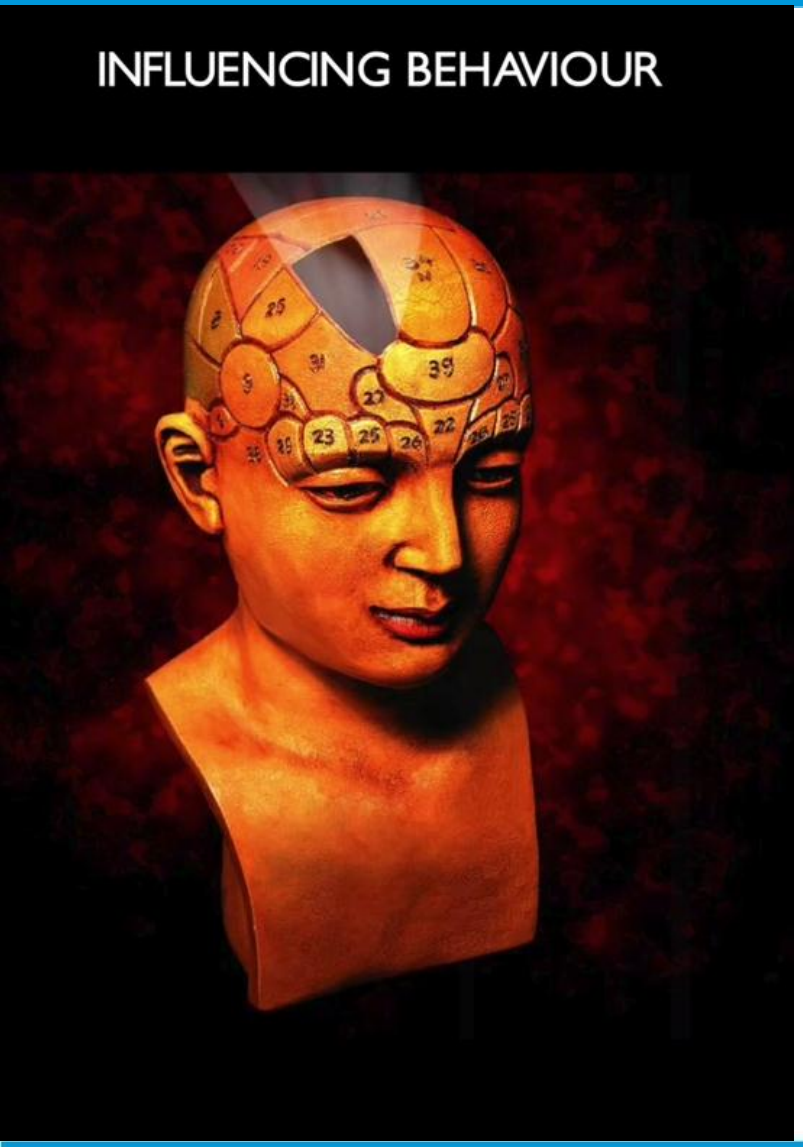
CBC News Posted: Jul 9, 2013 5:43 AM ET | Last Updated: Jul 10, 2013 5:58 AM ET

Toronto struggles to get back on track 2:49

# Resilience = Infrastructure + Behaviour

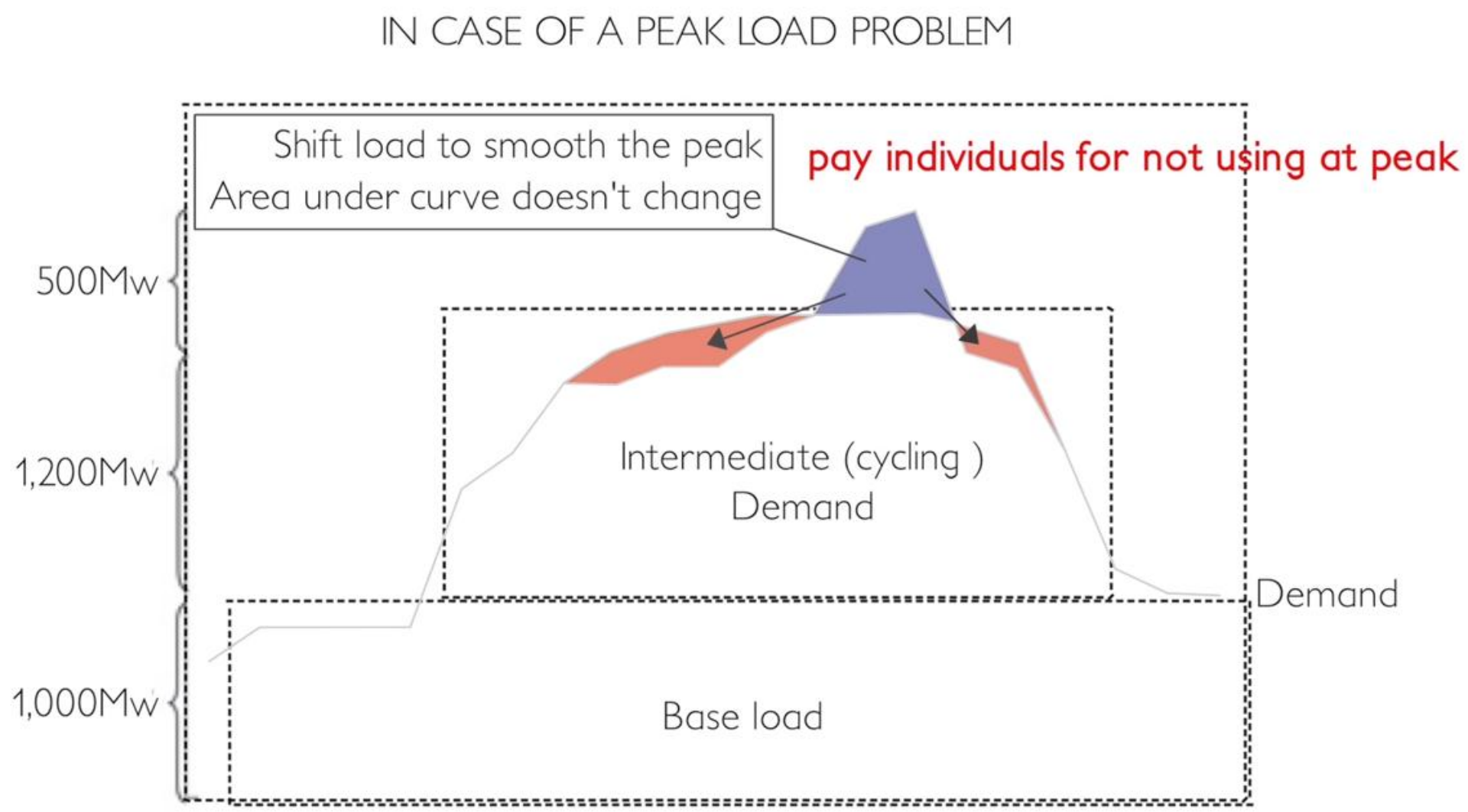
- For developing resilience in cities the focus should not be only on infrastructure. Even with the best infrastructure Cities will not be resilient without the right behaviour and an engaged population.
- Attention should be paid to the role citizen engagement and behavior change plays in making cities resilient.
- Software, targeted incentive schemes and a sharp focus on the demographics of the city can be used to facilitate engagement.
- A top down drive and a zero tolerance on unsocial behaviour can help cities achieve resilience.

# Seeking Community Cooperation and Influencing Community Behaviour



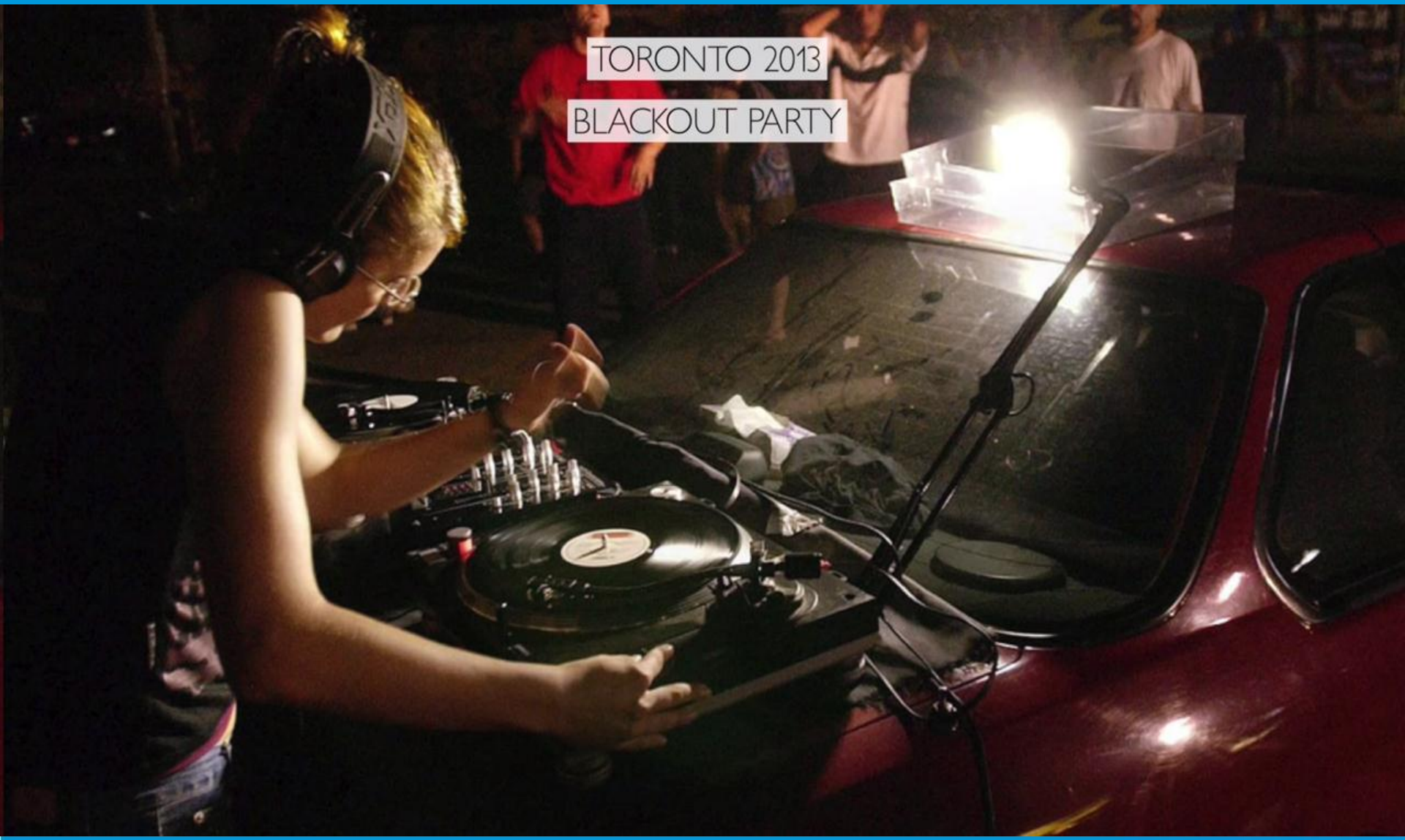

- Crisis of Dec 2013 Storm
- Toronto fully flooded
- Electricity Generation System Collapsed
- City without electricity
- People suffering due to cold
- Authorities sought People's cooperation to reduce consumption of electricity
- Need for rewards and incentives and disincentives

# Addressing the Peak load Problem – Rewarding citizens for socially beneficial behavior



# 2013 Blackout in the City of Toronto:

# City of Toronto: Engaging Community to deal with the Crisis during blackout

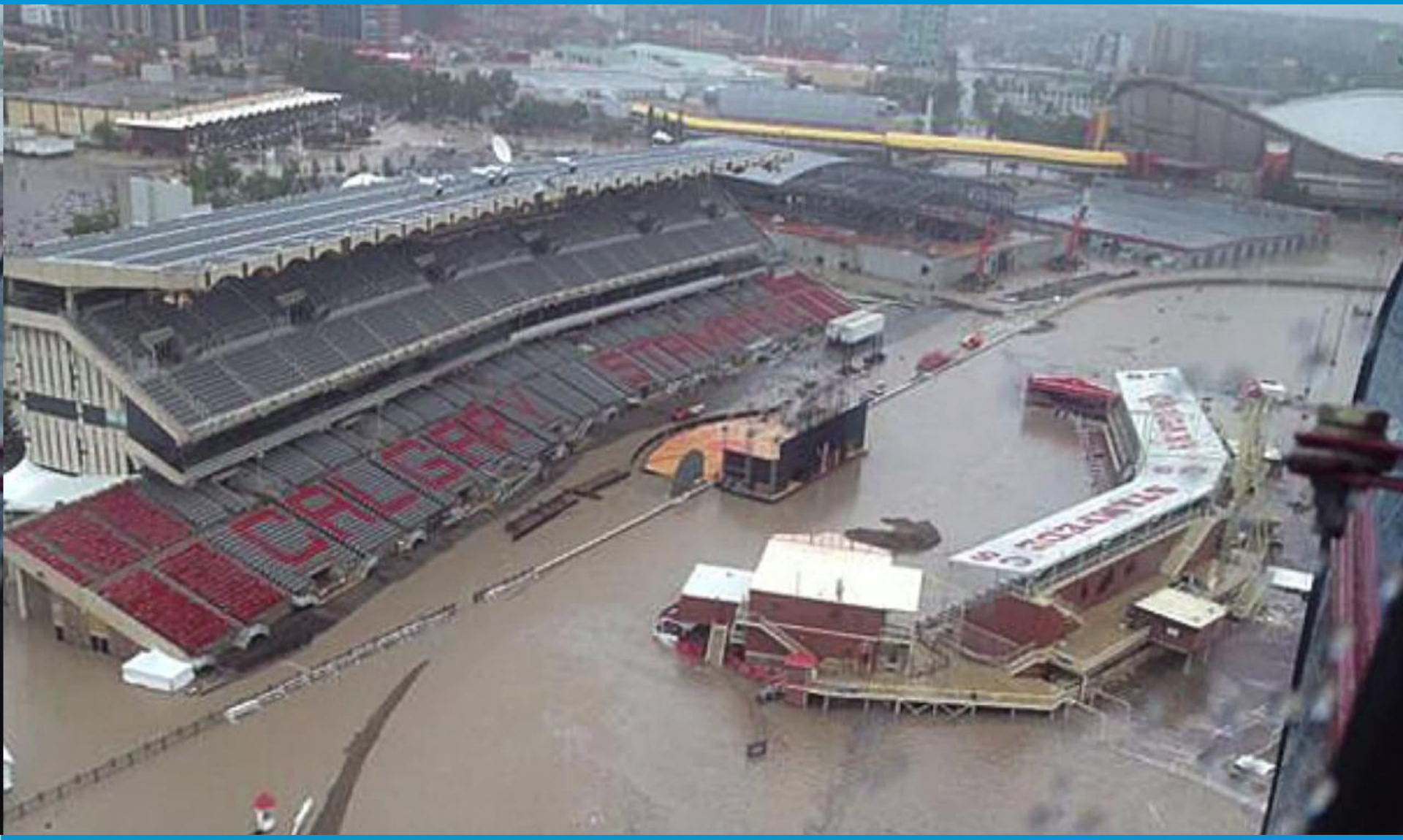


# City of Toronto: The Social Side of Resilience- Community Managing Traffic without signal lights

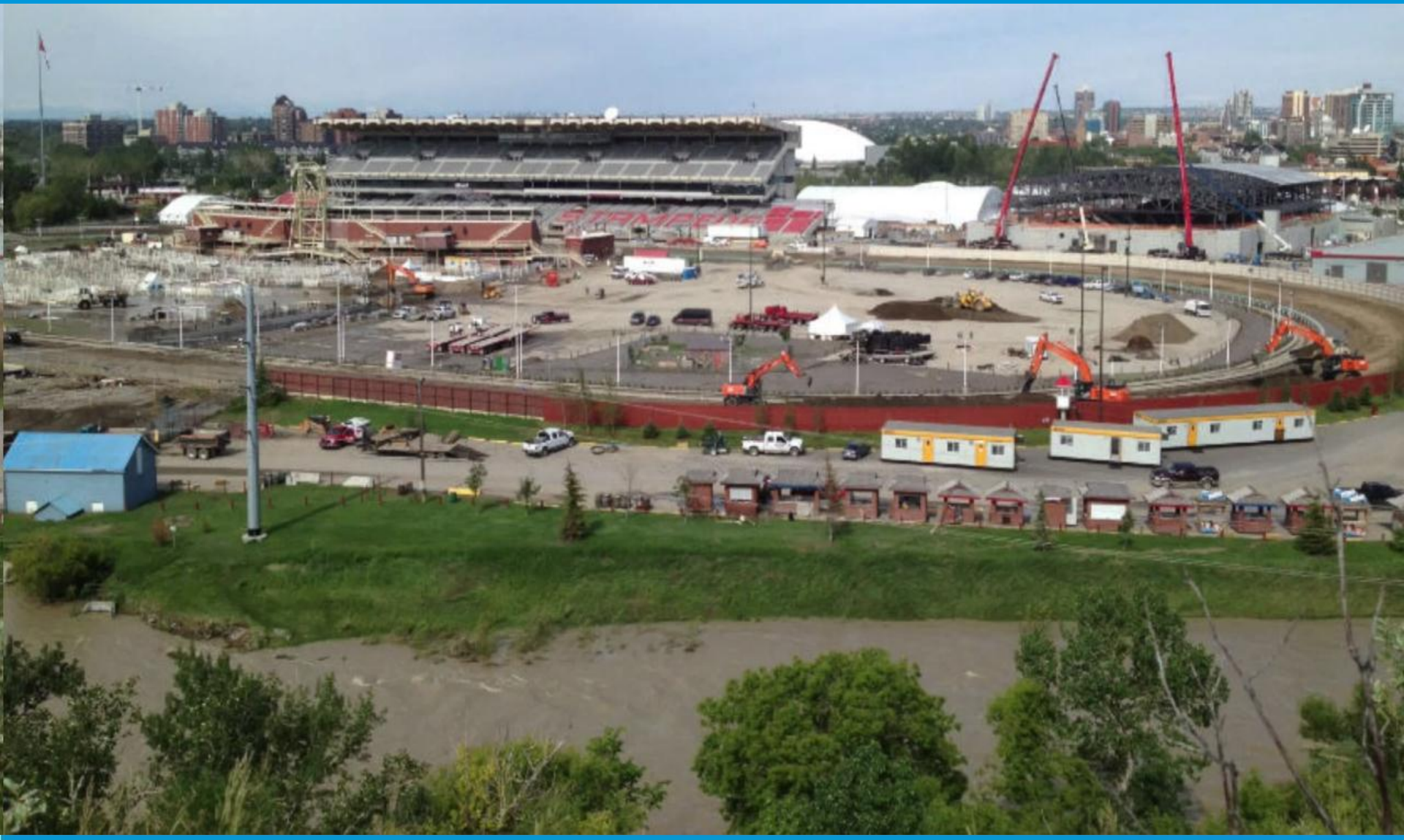
# 2013 Calgory City under flood

# 2013 Calgary

# Calgary in 2013 - Downtown Under Water



# Two Weeks After Calgary Restored with People Participation both Private Sector and Individuals



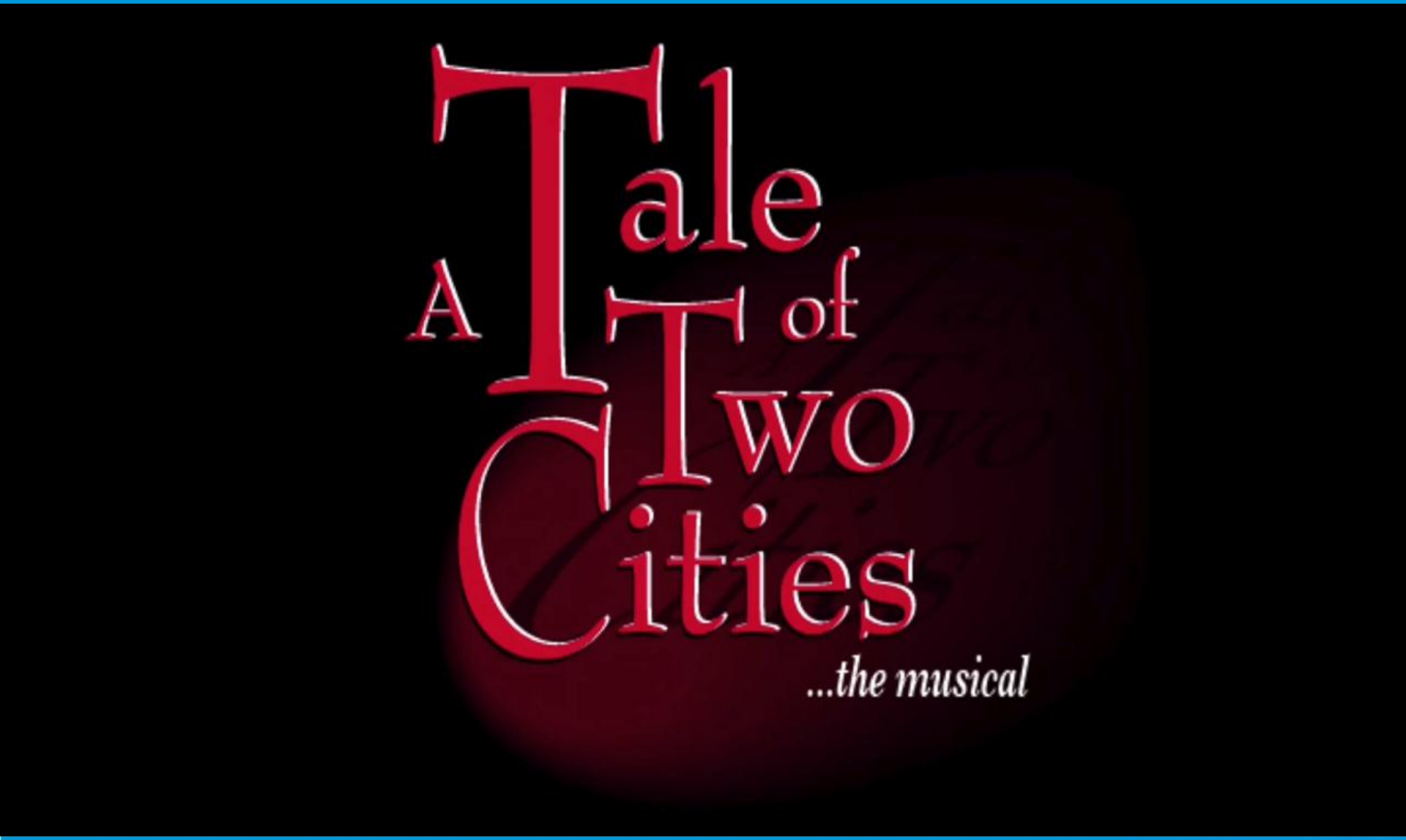
# Fostering resilience through community based innovations

- Create networks of local innovators – 'urban practitioners' working to boost the livability and resilience of their cities.

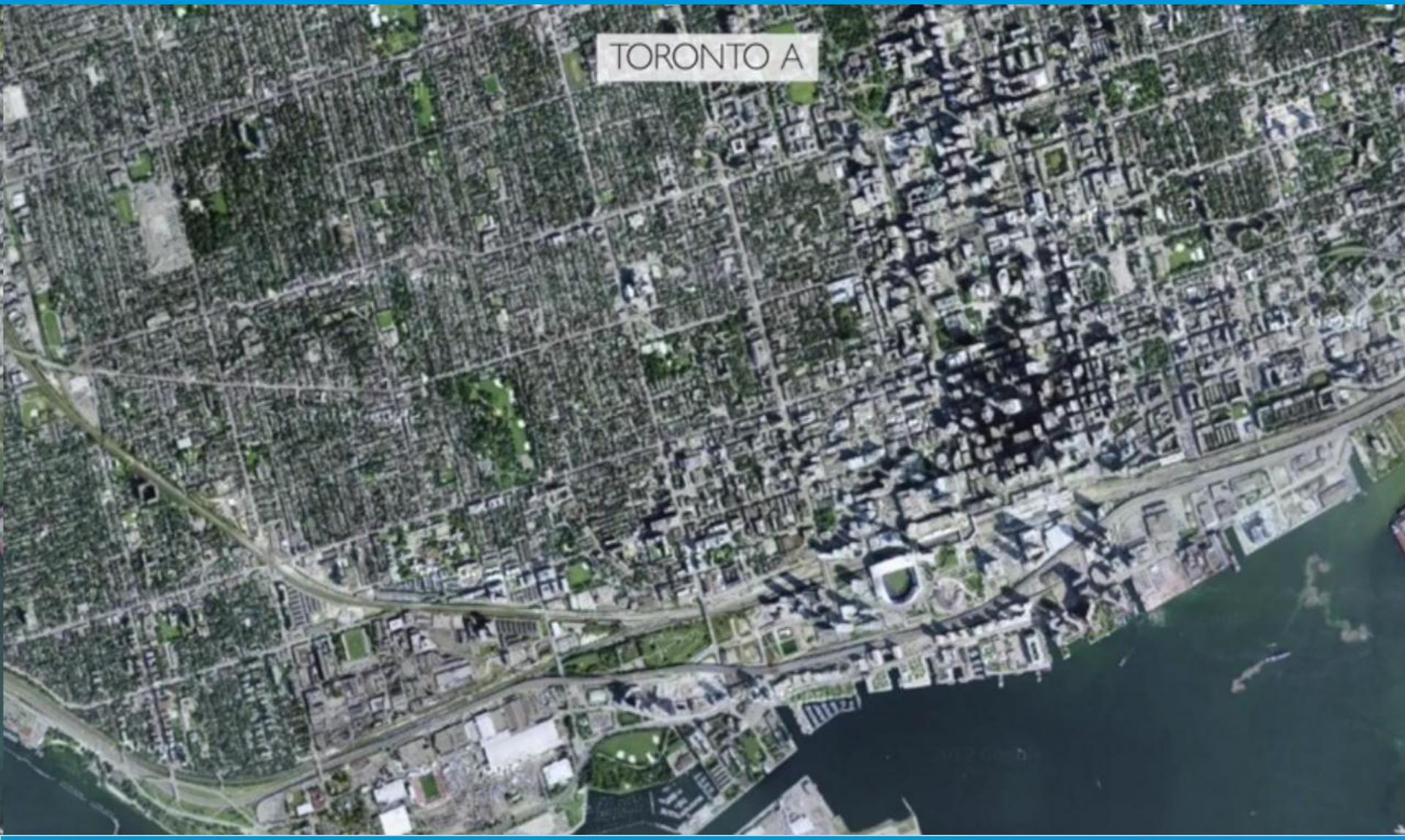
- Creating peer-to-peer learning platforms that encourage experimentation and tinkering. Successful approaches to be broadly communicated, and then adapted to other cities/communities/scales
- Resilience is a capacity that must be cultivated at all scales.
- Policies and funding must find ways to enable and support this capacity being developed.

- Pilots demonstrating the effectiveness of granular approaches to building resilience and livability provide opportunities for bridging the challenges and opportunities in cities around the world.

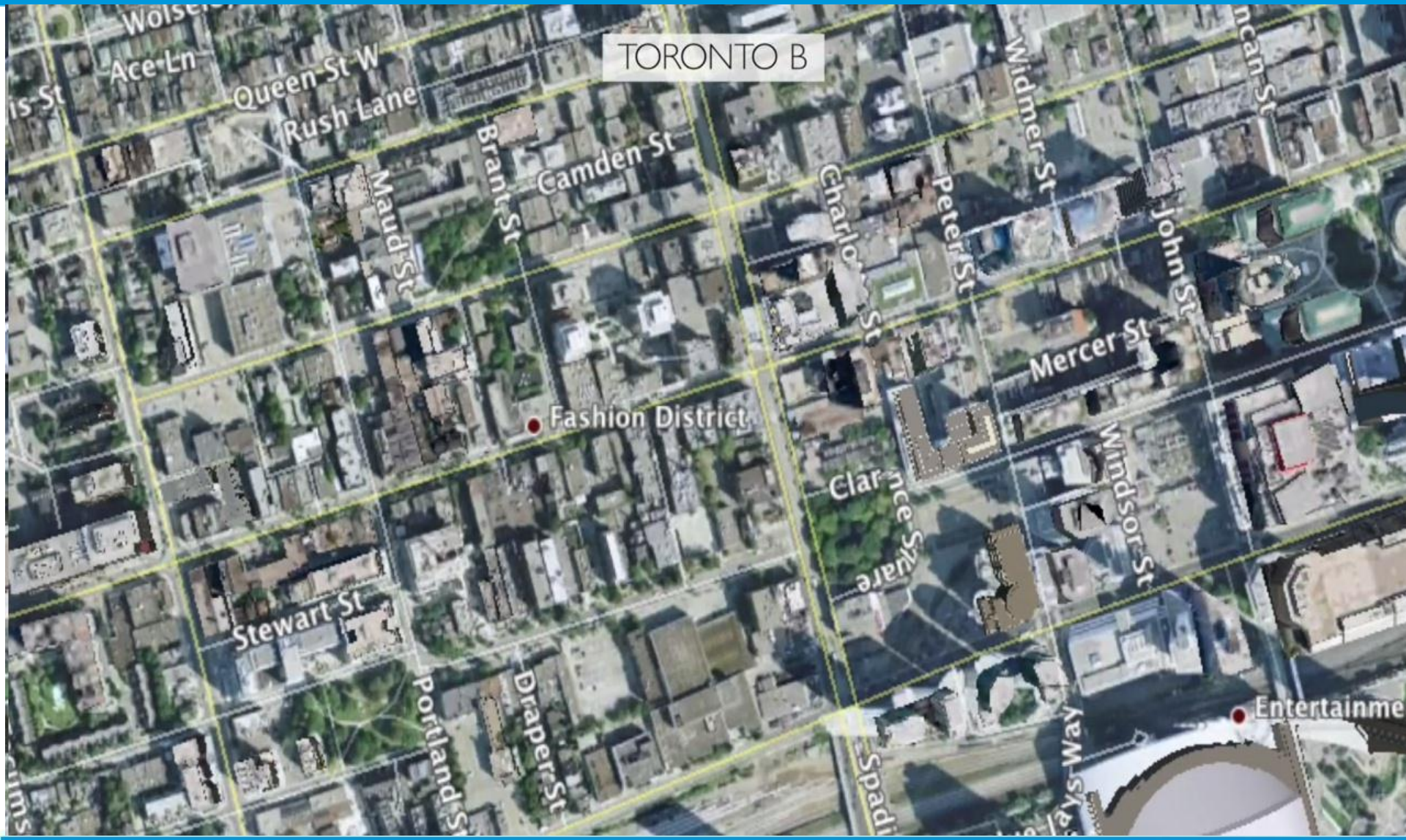
# Urban Planning for Building Resilience



# Toronto A: Sustainable, Resilient, Human and Most Innovative City



# Toronto B: Not sustainable, not resilient, inhuman City



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# Toronto A: Old Fashioned Building

# Toronto A: Old Building- Renovated many times

# Toronto A: Renovated Building Offices

# Toronto A: Renovated Building Ground Floor

# Toronto A:  People Friendly Streets

# Toronto B: Not So Resilient

# Toronto B: Newly Constructed on Railway Land near water but not Sustainable, Expensive, not Resilient

# 20th Century Urban Development Model not sustainable

- Rapid unmanaged and unplanned urban growth
  - Slums and Housing Backlog
  - Urban infrastructure and services backlog
  - Urban Sprawl
- Car Dependency
- High level of zoning
- Homogeneity
- Segregation and exclusion
- Loss of Street Life
- High energy demand and emission of greenhouse gases
- Increasing number of urban disasters

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# Business as Usual vs Sustainable & Smart Urban Development


Urban Sprawl -> Compactness

Segregation -> Integration

Congestion -> Connectivity


# The 21st Century Urban Model

- **High Quality of Public Space**
- 50% street and public space,
- well connected grid, at least 80 crossings / km2
- – supports local economy, connectivity, culture, creativity and future development

- **Proper and well designed density**
- Trigger economies of scale and ensure livability
  – at least 150 p/ha = 15.000 p/km2

- **Mixed Urban Uses**
- Avoid zoning, avoid highways dividing neighborhoods
- 40% of floor space allocated to economic uses
- Single use blocks cover less than 10% of

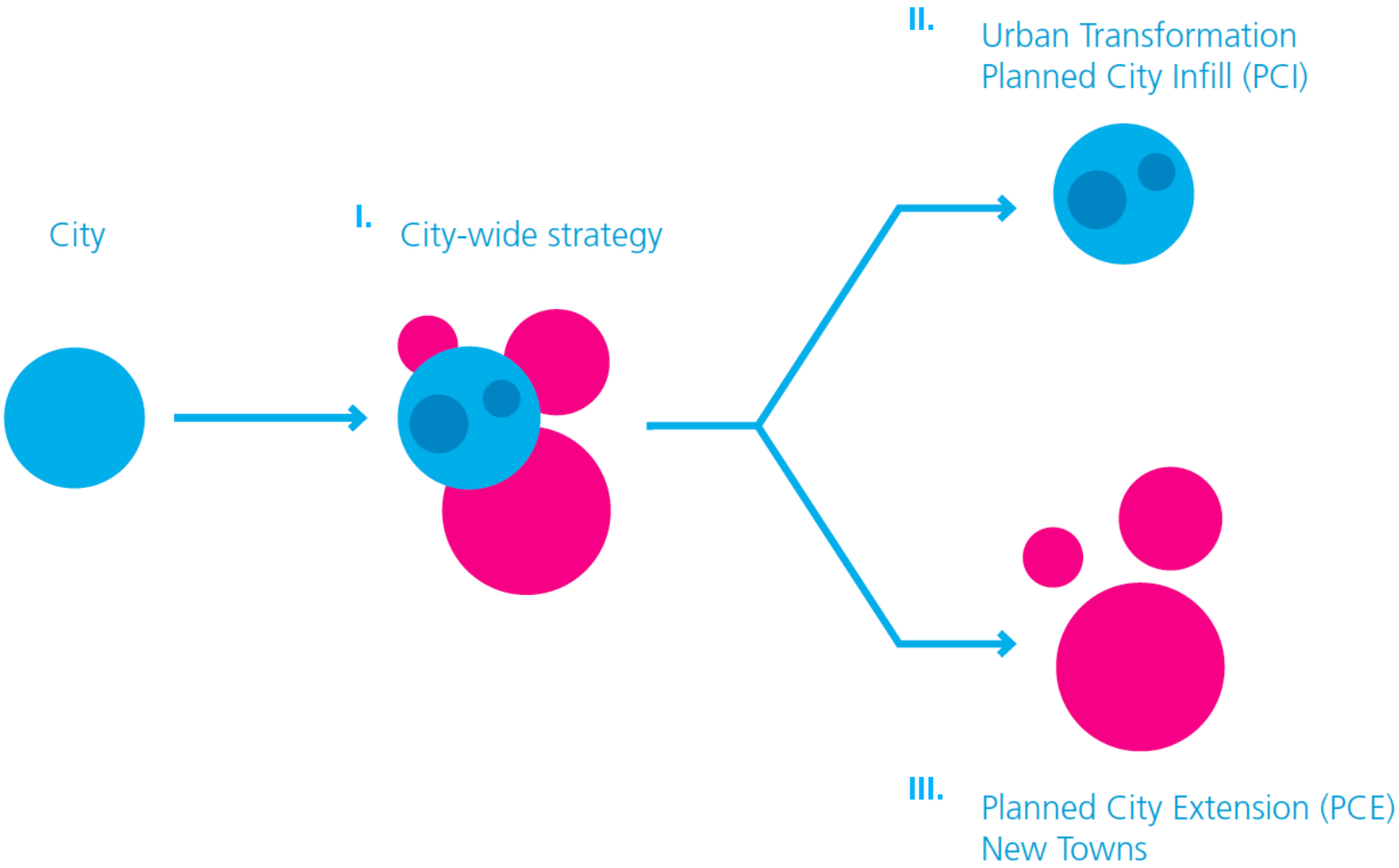
## The 21st Century More Sustaiable Urban Model

- **Mixed social structure**
- Social Integration, diversity of social groups, rental
- and ownership,
- different rent scales, cosmopolitan values,
- 20- 50% of residential space for low income residents

- **Urban Resilience**
- Climate Change Resilience, Disaster Preparedness and Management

- **Energy sustainable**
- Reduction of green house gases emissions

- **Practical and enforceable norms and rules**
- Participatory, democratic, respectful




Three domains of the Urban Planning and Design Lab

# THE BENEFITS OF SMART CITY EXTENSIONS

## ECONOMIC

- Increase of economies of urbanization
- Increase agglomeration benefits
- Increase of job opportunities, especially for the youth

## SOCIAL

- Socio-economic integration
- Mobility & transport provision
- Access to energy & clean water
- Increased public health and reduced safety risks

## ENVIRONMENTAL

- Compactness and low energy requirement
- Resilience
- Strengthen Biodiversity and the systems it supports

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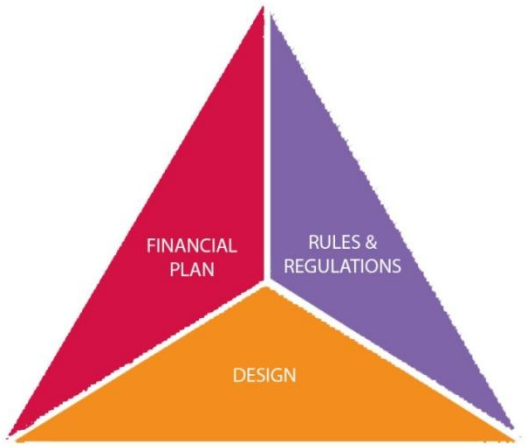
# Principles of Planned Urbanisation: UN-Habitat Approach

## THE THREE ENABLING COMPONENTS

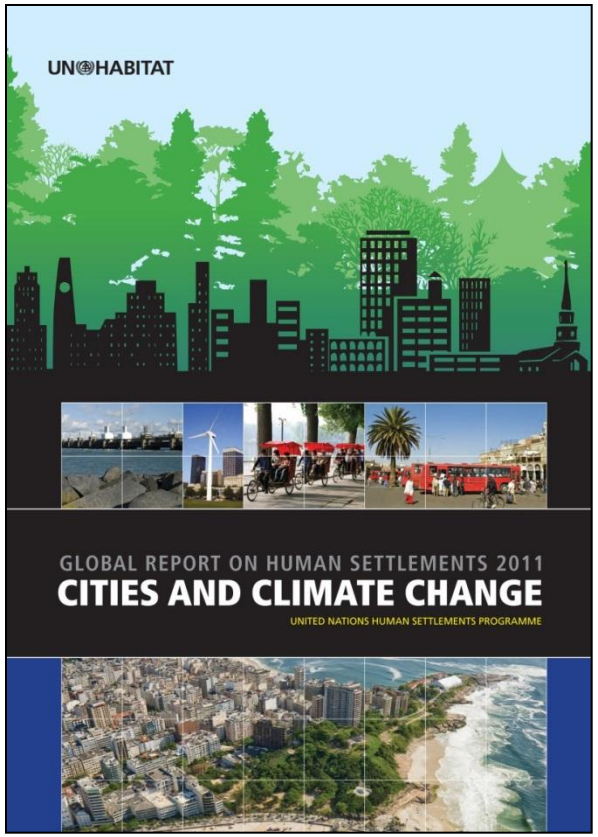
1. Rules and Regulations
2. Urban Planning and Design
3. Financial Plan




- Form that **generates** value.
- Good rules and regulations and a financial plan that **manages** value and attracts investment.

New York, 1882-83, Plan 1811

# UN-Habitat Publications on Climate Change




- **Global Report on Human Settlements – *Cities & Climate Change***
- ***Addressing Urban Issues in National Climate Change Policies - Policy Note***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# Thanks for your attention!!!