

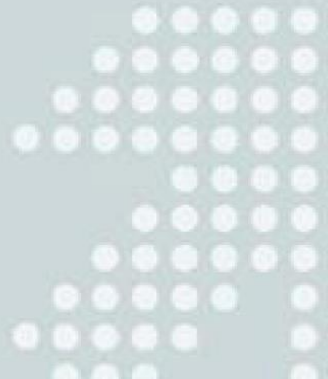


# MOBILITY AND NMT IN SUSTAINABLE URBAN DEVELOPMENT – ROLE OF CITY DEVELOPERS



**Kulwant Singh (PhD)**

**Urban Policy and Transport Specialist**



The majority of trips in Asian cities are done on foot



or using cycles



Developing countries often however face challenges in the form of...



**Inadequate pedestrian infrastructure**

Developing countries face challenges in the form of...



**Non-existent sidewalks**

Developing countries also face challenges in the form of...



**Inadequate cycling infrastructures**



**“In terms of infrastructure, what differentiates advanced cities are not highways or subways but quality sidewalks and cycleways”  
Enrique Penalosa, former Mayor of Bogota, Colombia**



**Our city planners should facilitate such development!**



# Developing Countries should target NMT- inclusive infrastructure development

City	Modal Split for Travel, Percent of Trips					Vehicle Ownership	
	Population (2001 Census)	Public Transport	Private Transport	Bicycling & Walking	Average Trip Length km	Vehicles Per 1000	Passenger Cars Per 1000
Ahmedabad	4,500,000	30	38	32	5.4	371	55
Bangalore	8,625,000	36	39	25	9.6	283	50
Bhopal	1,433,000	28	19	53	3.1	189	24
Chennai	7,014,000	39	30	31	8.6	226	45
Delhi	13,840,000	48	19	33	10.2	355	117
Indore	1,759,000	16	37	47	5.6	257	27
Jaipur	2,032,000	17	39	44	5.4	359	55
Mumbai	17,702,000	52	15	33	11.9	54	24
Mysore	787,000	26	23	51	2.5	380	40
Pune	4,200,000	12	54	33	6.1	335	48
Rajkot	1,002,000	13	38	49	3.7	403	33
Surat	2,430,000	13	31	55	5.3	492	55

City	Modal Split for Travel, Percent of Trips					Vehicle Ownership	
	Population (2001 Census)	Public Transport	Private Transport	Bicycling & Walking	Average Trip Length km	Vehicles Per 1000	Passenger Cars Per 1000
London	6,679,699	40	45	14	7.5	356	288
Paris	10,661,937	54	18	28	8.3	383	338
New York	18,409,019	54	35	11	16.7	459	412

# Urban Planning

**Asian Cities need to strengthen planning regimes to more effectively guide and shape the location and form of development.**

**Urban Planning considerations to help achieve sustainable travel behaviors include**

- **settlement size,**
- **strategic development location,**
- **density,**
- **jobs–housing balance,**
- **accessibility of key facilities,**
- **development site location,**
- **mix of uses, and**
- **neighborhood design and street layout.**

**Alongside transport and infrastructure provision, traffic demand management measures, and wider efforts to change travel behavior norms and aspirations, urban planning can create the appropriate physical location of activities for sustainable travel patterns. Interventions can take place**

# Sustainable Mobility Options

## Developing greater sustainability in travel patterns

**Methodologies and Approaches 'AVOID-SHIFT-IMPROVE' typology:**

- **AVOID:** Reduce the need to travel
- **SHIFT:** Change the transport modes that people choose
- **IMPROVE:** Increase the energy efficiency of vehicles and fuels

# Packaging the Components of a Strategy

**AVOID:** Reduce the need to travel.

- urban planning
- traffic demand management

**SHIFT:** Change the transport modes that people choose.

- public transit
  - mass and light rapid transit
  - bus rapid transit
  - ultralight and demand-responsive transit
- **non-motorized transport**
  - **walking and cycling**

**IMPROVE:** Increase the energy efficiency of vehicles and fuels.

- low-emission vehicles and alternative fuels

# Why Non-Motorized Transport?

- Low Cost Infrastructure
- Higher User Safety
- Environment friendly
- Low Cost for users
- Healthy for users
- Low-Cost Vehicles



# Why Non-Motorized Transport?

## Reduces greenhouse gases emissions Provides important health benefits

- Lower all-cause mortality\*\*
- Less high blood pressure\*\*
- Less type 2 diabetes\*\*
- Less colon cancer\*\*
- Less depression\*\*
- Better body mass index and body composition\*\*
- Better functional health in older adults\*\*
- Less risk of falls in older adults\*\*
- Better cognitive function\*\*
- Better quality sleep\*
- Better health-related quality of life\*



Health effects associated with physical activity  
Key: \*\*: strong evidence; \*: modest evidence.  
Source: U.S. Department of Health and Human Services (2008)

- Less coronary heart disease\*\*
- Less stroke\*\*
- Less metabolic syndrome\*\*
- Less breast cancer\*\*
- Better fitness\*\*

# PROMOTING NMT IN A COUNTRY - ROLE OF CITY DEVELOPERS / CITY LEADERS AND PROFESSIONALS

# TRANSFORMATIVE CHANGE

## Working towards a people oriented city

### I. CATALYSTS FOR ACTIVE MOBILITY: WHY HAVE CITIES BEGUN EMBRACING WALKING AND CYCLING?

- SAFETY
- URBAN LIVEABILITY AND TRAFFIC CONGESTION

**“The city is growing more and more dense, and that density makes the city creative and innovative. But building more roads is not the answer to that development. We need to focus on other investments and strategies.”**

**Jannette Sadik-Khan (NYC DOT commissioner 2007-2013)**

MAKING IT HAPPEN: HOW CITIES TOOK STEPS TOWARDS ACTIVE MOBILITY / NMT

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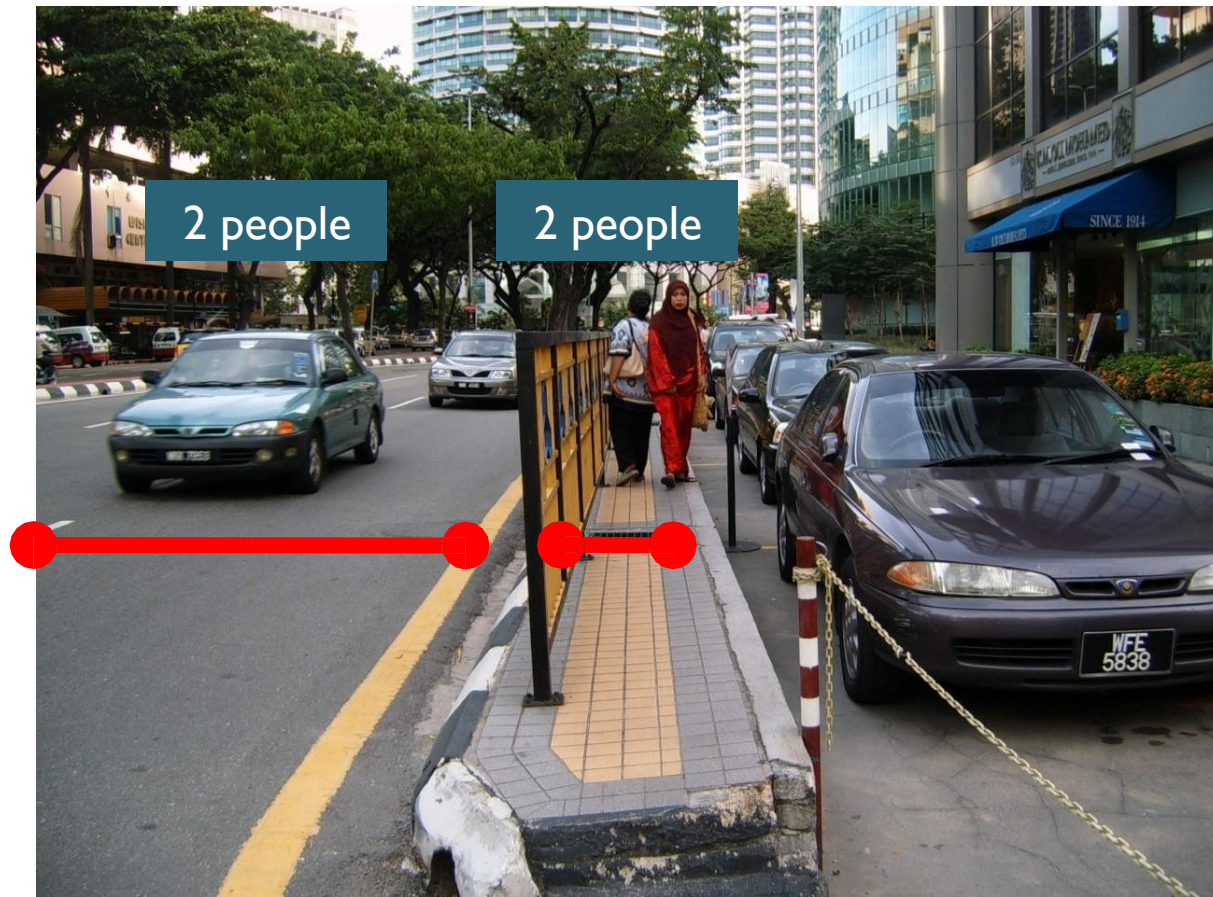
“The city is growing more and more dense, and that density makes the city creative and innovative. But building more roads is not the answer to that development. We need to focus on other investments and strategies.” – Jannette Sadik-Khan (NYC DOT commissioner 2007-2013)



# Equity

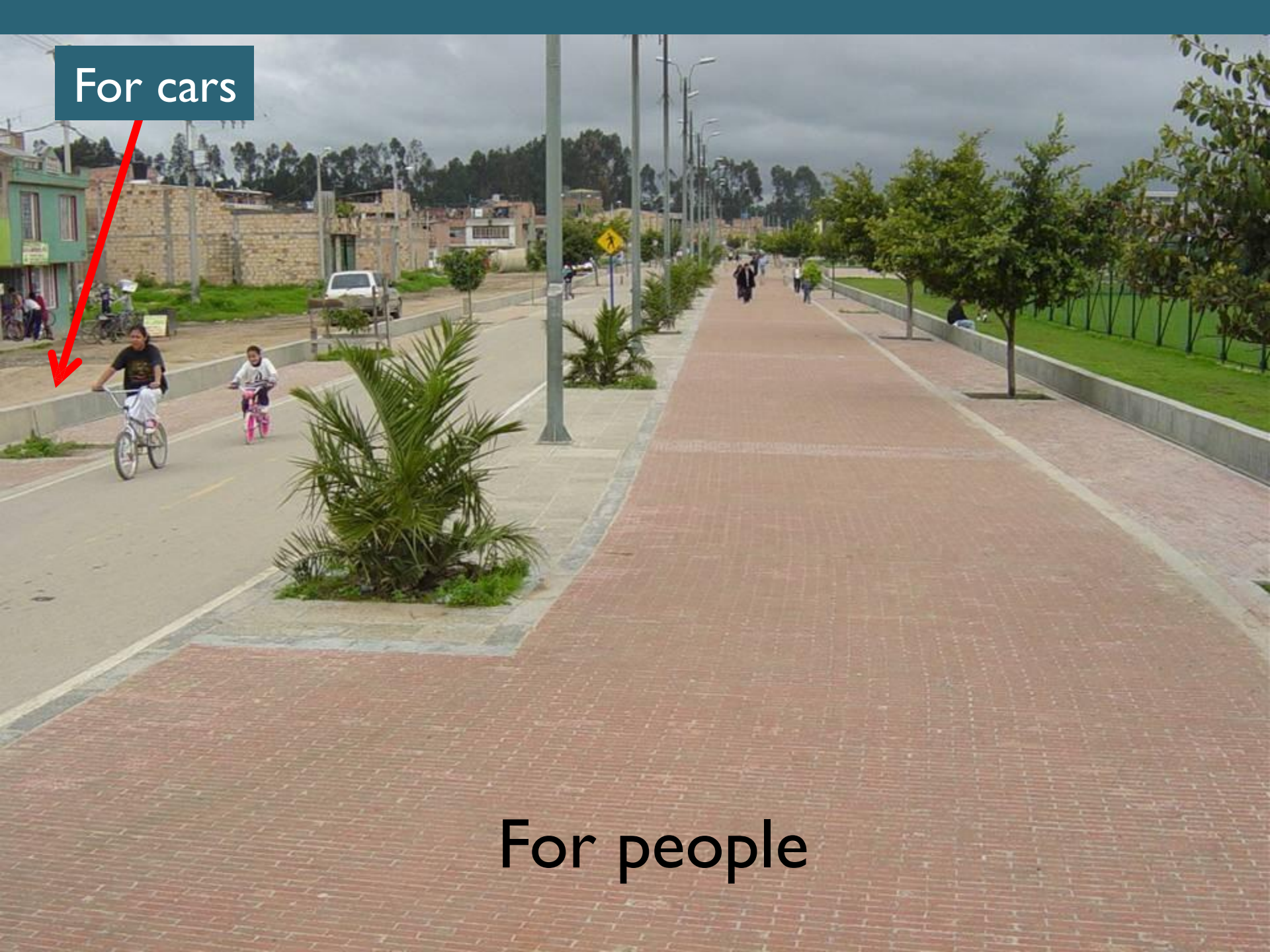
“The highest priority should go to public transport, walking and non-motorised vehicles that are accessible to almost everyone and have low impacts”

Enrique Peñalosa



For cars

For people



# MAKING IT HAPPEN: CITIES TO TAKE STEPS TOWARDS ACTIVE MOBILITY / NMT

## **Factors in cities supporting Active Mobility / NMT.**

- 1. High density, compact, fine grained urban form**
- 2. Mixed use environment**
- 3. Strong civic and sharing culture**
- 4. Good public transit**

## **Factors hindering NMT**

- 1. Car-centric/anti-cyclist culture**
- 2. Car-oriented infrastructure design (e.g. junctions, road design)**

## **Factors blocking NMT (Walking and Cycling)**

- 1. Urban sprawl and mono-functional land use**
- 2. Car-oriented transport network**

# Success Factors for City Transformation

## 1. Effective collaboration between government and civic society

**Amsterdam:** NGOs like the Fietsersbond promoted the bicycle as an instrument of liveability and sustainability

## 2. Visionary Leadership: transformation in a snap

**New York City:** The Bloomberg administration demonstrated the positive impacts of pedestrianisation and bicycle infrastructure

## 3. People-oriented planning

**Copenhagen:** Tracking the performance of their walking and cycling initiatives, supporting policy-making and review with concrete pedestrian and cyclist traffic counts.

## 4. Transformation through major impactful projects

**Seoul:** implement bold major projects, including transforming a major viaduct in the heart of downtown into an elevated park

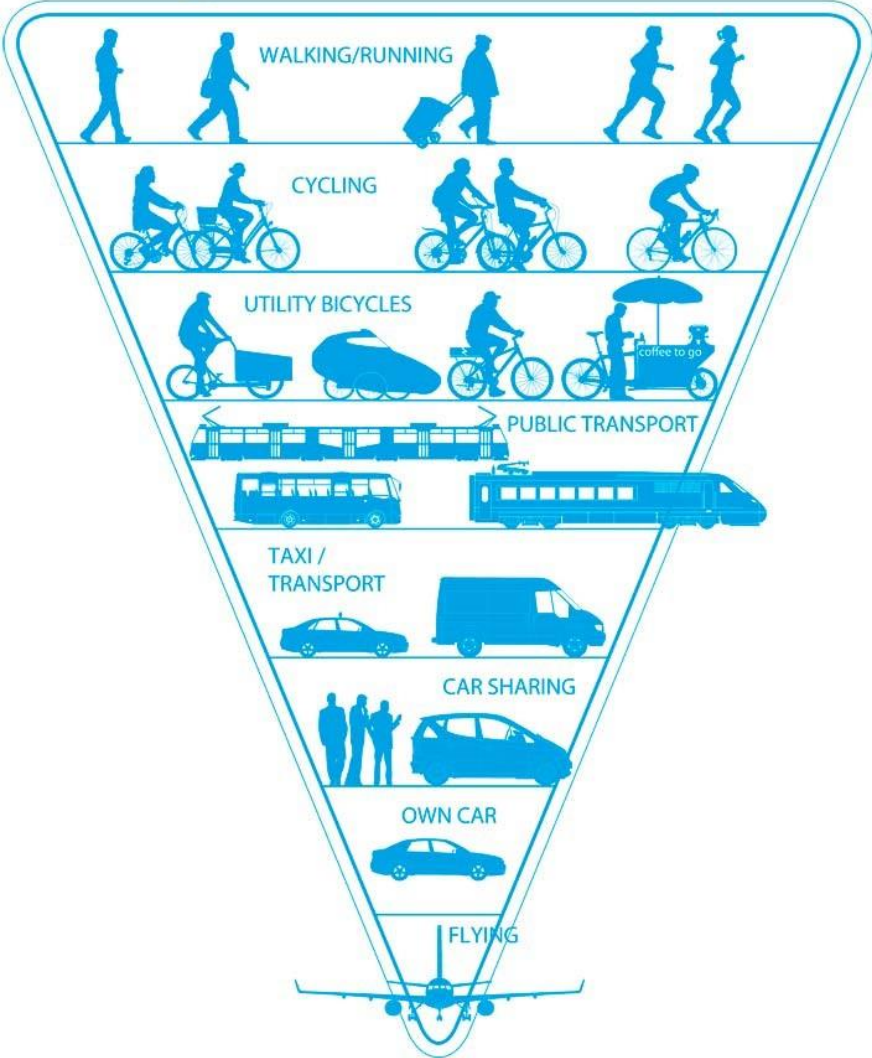
## 5. Strong civic culture

**Taipei:** Taipei's success is based on a strong civic culture of sharing and mutual respect which facilitates space sharing.

# Adopting Sustainable Transportation Policy and strategies



THE REVERSE TRAFFIC PYRAMID  
BY  
*bicycle innovation lab*



Source: Bicycle Innovation Lab

# PLANNING NMT IN A CITY - ROLE OF CITY DEVELOPERS / CITY LEADERS AND PROFESSIONALS

# Planning for non motorized transport in urban areas



# NEGLECTED WALKING AND CYCLING



**MORE CYCLING = SAFER CYCLING**

**A critical mass of cyclists makes cycling safer, though dedicated facilities are useful. BEIJING (PRC)**



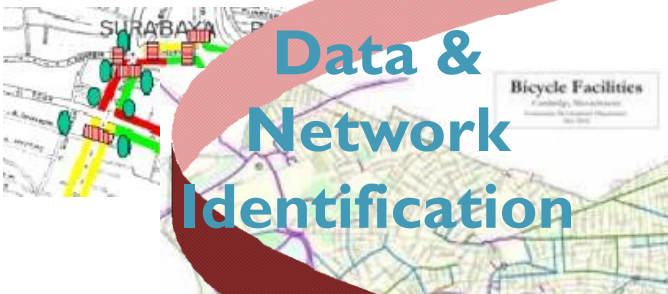
# City Developers to emphasise on NMT planning



**Planning**



**Regulation**

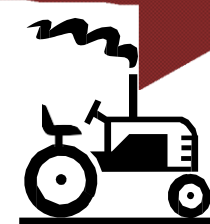


**Data &  
Network  
Identification**

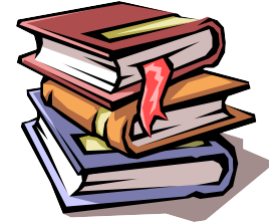


**Design**

**Implementation**



# Regulation



## Vehicle use regulation

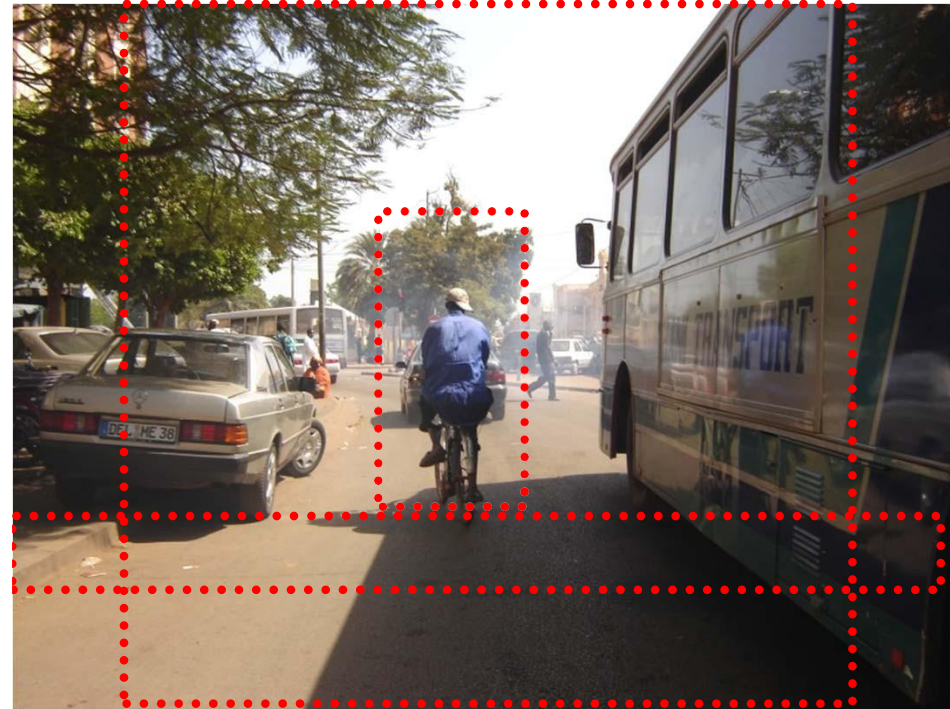
- Justifications for restrictions of NMT modes accessing some roads
- Determining priority between motorized and non-motorized vehicles

## Vehicles operation regulation

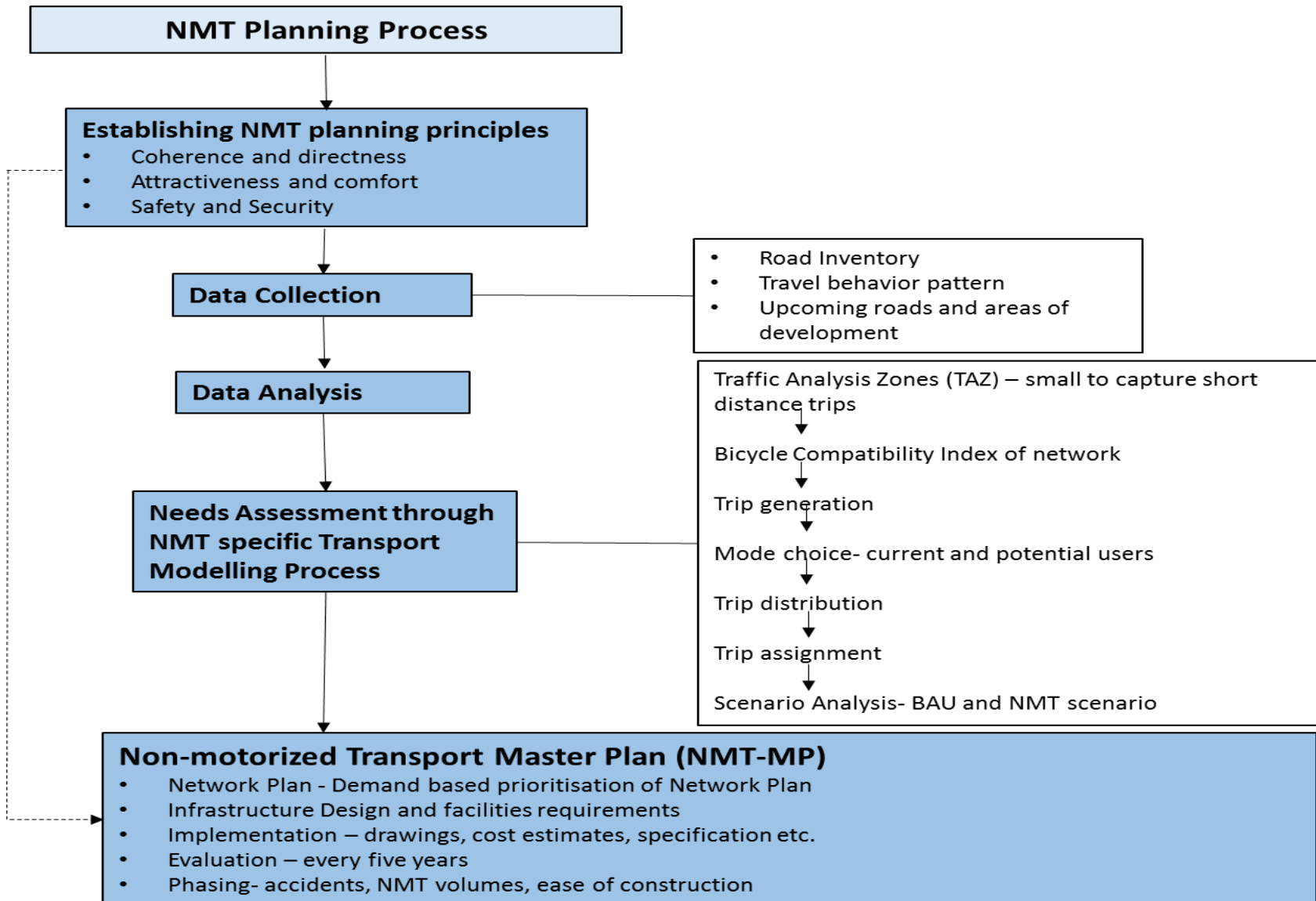
- Regulate the operations of non-motorized vehicle usage

## Infrastructure design regulations

- Standardize NMT planning and design process
- Integrating NMT facilities within the existing transport network
- Linking design standards to speed limits and the road hierarchy



# NMT Planning Process – a Schematic Diagram



# Planning



- Integrating non-motorized transport into transport master plans
- Project team and task force formation
- Selection of areas to be improved



Map of Bogotá Master Plan

Netherlands ( [www.i-ce.info](http://www.i-ce.info) )

## 8.2. Project team and task force formation

Whether integrating non-motorised transport into a transportation master plan, developing a cycling master plan, or incorporating non-motorised travel concerns into a major transport project, a **project team** must be formed. The project team could be a special

project. The planning methodology will differ depending on whether it is a **neighbourhood-specific pilot project** or a **city-wide master plan** that is being developed.

For pilot projects, there are several factors to consider. A pilot location should have:

1. A high level of political commitment to NMT improvements by the district or ward (most local level) government. A city-wide project should be considered if it has the backing of the mayor.
2. A high level of support for NMT improvements in the community.

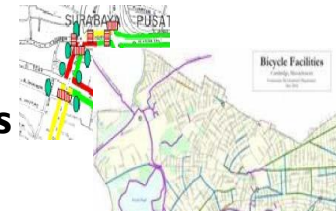
transport in the project city, and the responsible persons within each relevant government agency. These responsible persons should be invited to join a **Non-Motorised Transport Task Force or Committee**, which in turn might select a Chairman of this Committee responsible for inter-agency coordination. This Task Force is not responsible for doing the planning but for

## Keywords / Snapshots



*Non-Motorised Transport in African Cities – Options for Interventions and Networking in Medium-Sized African Cities*, Walter Hook, Jürgen Heyen-Perschon, New York / Hamburg 2003, GTZ

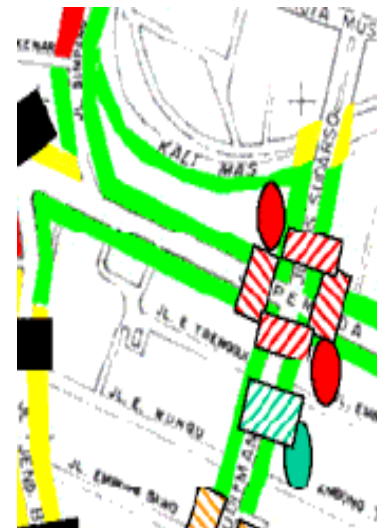
# Data & Network Identification



- Review of existing institutional structures and NMT regulations
- Assemble data on existing non-motorized travel
- Review and compile information on major transportation infrastructure projects underway
- Analyze the quality of existing facilities for non-motorized travel
- Document sidewalk conditions
- Analyze the safety conditions for non-motorized travel, identifying the bicycle network
- Pedestrian route analysis
- Safety requirements for networks of cars and cyclists

Table of areas for investigation and evaluation when intervention:

Area for investigation	Criteria	Key variables
<i>Safety</i>	Vehicle speed	Max. vehicle speed
	Traffic conflicts	Number of gradual conflicts – related
	Traffic behaviour	
	Death rates	On arterial roads On other roads
	Accident rates	On arterial roads On other roads
	Traffic behaviour	Speeding



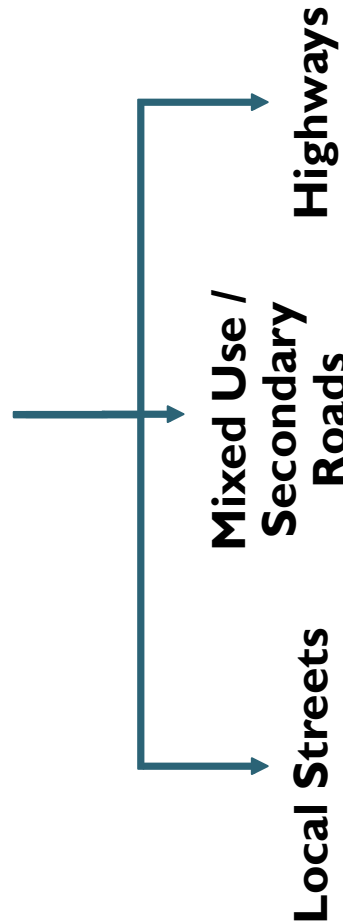
-  unusable sidewalk
-  overpass
-  invisible zebra crossing
-  visible zebra crossing

# Design



## Overview

- Overview of designing appropriate NMT facilities
- Design based on roadway function
- Design based on safety
- Intersection design
- Design resources



- Primary arterials
- Crossing facilities
- Integrating NMT on Mixed Use or Secondary Arterials
- Wide curb lanes and non-physically separated NMV lanes
- Physically separated or partially separated NMV lanes
- Local street design
- Parking control
- Pedestrian zones
- Traffic calming and post traffic calming

# Design

## Pros / Cons

There are advantages and disadvantages of having physically separated NMV lanes as opposed to lanes only separated by road markings

## Advantages are

They are less frequently obstructed by double parked cars or illegal use by motor vehicle and motorcycles

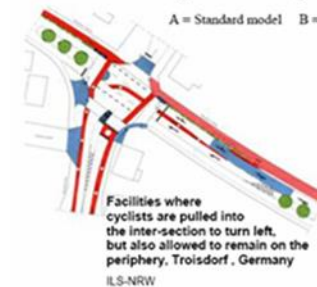
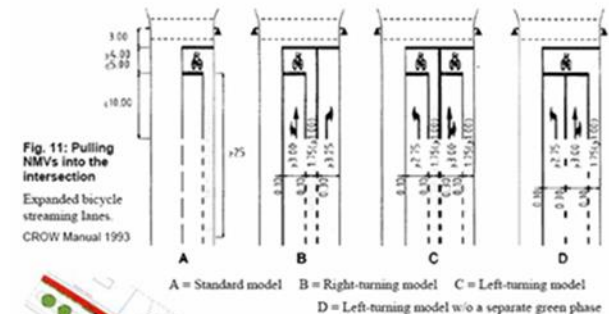
- They provide a greater sense of security to the NMV user
- They can allow for 2-directional NMV travel, even on one-way roads
- They ensure that NMV users will not make sudden movements into the motor vehicle lanes or obstruct motorists
- They are self-enforcing

## Disadvantages include:

If they are too narrow, a single three-wheeler can obstruct the lane

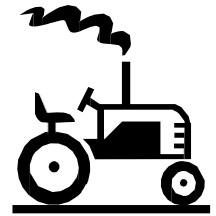


Sketches



Intersection in Utrecht, Netherlands, where each mode (foot, bike, car, ... etc.) has its own lane and signal

# Implementation



## Key considerations

- Overcoming political, technical, and cultural barriers
- Financing NMT infrastructure
- Technical assistance and support

## Commitment / Capacity

SECTIONS TARGETED	MUNICIPALITY		
	Engineering Department	Planning Department	Traffic Department
Types of capacity (Short Term)	<ul style="list-style-type: none"> <li>▪ Designing of infrastructure</li> <li>▪ NMT specific knowledge</li> </ul>	<ul style="list-style-type: none"> <li>▪ Monitoring and evaluation</li> <li>▪ Reporting and documentation</li> <li>▪ NMT specific knowledge</li> </ul>	<ul style="list-style-type: none"> <li>▪ Communication management and coordination</li> <li>▪ NMT specific knowledge</li> </ul>
Types of capacity (Long Term)		<ul style="list-style-type: none"> <li>▪ Monitoring and evaluation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enforcement of law and order</li> </ul>

## Financing NMT Infrastructure

Use by municipalities on a variety of infrastructure needs. Typical sources of such revenues should be:

- Vehicle registration fees and other vehicle taxes
- Local fuel tax
- Parking charges
- Revenue from traffic violations
- Revenue from advertising on bus shelters and along roadways



The 5 key requirements for NMT planning also called  
**“S.P.A.C.E”**

# I. Road Safety – Reduce Speed and mode separation





**Low vehicular speeds where cyclists and cars cross  
All the city: 30 km/h**

# Pedestrian Safety – would you walk here?



perceptions of poor safety discourages walking/cycling

# Pedestrian Safety at Crossing





**The road ring in Houten: 80 km/h  
→ crossing in tunnel**

## 2. Direct routes/ express routes without detour and delay

**An infrastructure that offers the cyclist direct routes, without detours and without delays**

**Objectives:**

- **Reduce the time of the trip**
- **Reduce the effort to cycle** Preferable:
- **Bidirectional traffic for cyclists whenever possible**



Contra-Flow Cycle Lane, Darmstadt

## 2. Direct Routes/ express routes without detour and delay

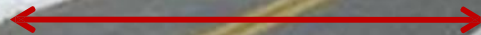




# Shortcuts



# Bi-directional Bikepath on one side : direct routes



2.80 m.

- Direct Routes
- Coherence
- Road Safety
- Attractive Routes

### 3. Accessibility / Coherence : Consistent, Continuous, and Adequate Amenities

The infrastructure forms a coherent unit and is linked to the origins and the destinations of cyclists

That's why we need:

- Consistent quality
- Different design
- Continuity
- Few changes in the design & width
- Complete routes
- No interruptions
- Adequate signalling





Can elderly persons and people with special abilities use such NMT facilities?





**Can elderly persons and people with special abilities use such NMT facilities?**



# Role of City Developers / City Leaders and Professionals

- **Creating Healthy Places through Active Mobility / NMT**
- Improve the health and quality of life of their residents in holistic, integrated ways through the use of alternative, green modes of transport or new technology.
- Develop most strategic plans and bold mobility projects.
- Develop solutions to their own cities' challenges, being mindful of their unique resources, capabilities and needs.

# BUILDING HEALTHY CITIES THROUGH ACTIVE MOBILITY

NMT the greenest and healthiest mobility option

Making NMT as an active transportation a priority has multiple benefits, including: effective and convenient mobility, an enriched urban experience, economic and environmental dividends, and improved cohesiveness and connectivity between neighbourhoods.

**Why should city planners be talking more about active mobility?**

- 1. URBAN CAPACITY FOR MOTORISED TRANSPORT IS REACHING ITS CAPACITY**
- 2. ACTIVE MOBILITY IS NECESSARY FOR BUILDING HEALTHY AND LIVEABLE CITIES**
- 3. NMT / ACTIVE MOBILITY IS GAINING GLOBAL PROMINENCE**
- 4. TROPICAL CITIES LIKE SINGAPORE CAN ALSO BE WALKABLE AND BIKEABLE TOO**

# Why should cities promote walking and cycling?

## **MEETING MOBILITY NEEDS FOR ALL**

- i. EFFECTIVE AND CONVENIENT MOBILITY**
- ii. ENRICHING URBAN LIFE**
- iii. REAPING ECONOMIC DIVIDENDS**
- iv. BUILDING MORE COHESIVE COMMUNITIES**
- v. DOING YOUR PART FOR A SUSTAINABLE ENVIRONMENT**



# ROADBLOCKS TO ACTIVE MOBILITY

## Key challenges in promoting walking and cycling

### i. INSTITUTIONAL FRAMEWORKS AND DEVELOPMENT POLICIES

Are cities getting built for cars or for people?

Is there sufficient legislative support?

**Need for laws to support and Promote NMT**

**Need for city champions**

### ii. INFRASTRUCTURE DEVELOPMENT AND DESIGN

Does the planning framework support active mobility / NMT?

- Lack of seamless multi-mode journeys
- Complementary facilities

**“Roads designed only for cars neglect cyclists as equal road users”**

**Is the infrastructure designed for cars or for people?**

- Transport infrastructure that prioritises motorised transport

# ROADBLOCKS TO ACTIVE MOBILITY / NMT

## iii. CULTURE, BEHAVIOUR AND PERCEPTIONS

- Pedestrians and cyclists sometimes viewed by drivers as annoying encumbrances on the roads. This sentiment poses a formidable challenge to changing the status quo.

***“I would never let my child ride their bike to school – it’s too dangerous!”***

- Inaccurate perceptions of safety stigmatise cycling as a highly dangerous form of commuting. Safety is often compromised by car-centric road designs that affect a driver’s visibility of cyclists and pedestrians.

***“It’s too cold / hot / rainy / humid!”***

*Tropical weather should not be taken as a limiting factor says Professor Marilyn Taylor*

# Strategy to improve the quality and safety of walking

- **New pedestrian links to create a network of convenient routes;**
- **Better footways (paving, landscaping, lighting, street furniture);**
- **Streets and public areas that create interest for pedestrians (building frontages, signs, and advertisements scaled for the pedestrian rather than the vehicle);**
- **Priority for pedestrians on residential and local streets and central areas;**
- **Better crossing facilities, including reduced speed and volume of traffic and increased crossing time for pedestrians; and**
- **Developments that ensure facilities can be reached on foot easily.**

## Strategy to improve the quality and safety of cycling

- **The provision of a fully segregated cycle network alongside facilities within the main road and footpath network;**
- **Traffic calming so that speeds of vehicles are closer to those of cyclists; and**
- **Parking and storage facilities that are secure and conveniently located.**

# SEOUL (REPUBLIC OF KOREA) CLASSIC EXAMPLE OF SUSTAINABLE, INTEGRATED TRANSPORT



# TRANSFORMATIVE CHANGE

## Working towards a people oriented city

- I. **CATALYSTS FOR ACTIVE MOBILITY: WHY HAVE CITIES BEGUN EMBRACING WALKING AND CYCLING?**
  - **SAFETY**
  - **URBAN LIVEABILITY AND TRAFFIC CONGESTION**

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**MAKING IT HAPPEN: HOW CITIES TOOK STEPS TOWARDS ACTIVE MOBILITY / NMT**

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# MAKING IT HAPPEN: CITIES TOOK STEPS TOWARDS ACTIVE MOBILITY

## **Factors in cities supporting Active Mobility.**

1. High density, compact, fine grained urban form
2. Mixed use environment
3. Strong civic and sharing culture
4. Good public transit

## **Factors hindering NMT**

1. Car-centric/anti-cyclist culture
2. Car-oriented infrastructure design (e.g. junctions, road design)

## **Factors blocking NMT (Walking and Cycling)**

1. Urban sprawl and mono-functional land use
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# Success Factors for City Transformation

## 1. Effective collaboration between government and civic society

**Amsterdam:** NGOs like the Fietsersbond promoted the bicycle as an instrument of liveability and sustainability

## 2. Visionary Leadership: transformation in a snap

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## 4. Transformation through major impactful projects

**Seoul:** implement bold major projects, including transforming a major viaduct in the heart of downtown into an elevated park

## 5. Strong civic culture

**Taipei:** Taipei's success is based on a strong civic culture of sharing and mutual respect which facilitates space sharing.



Amsterdam (The Netherlands):  
Portraying low-carbon mobility  
options as fun, cool, optimal  
ways to travel.

## AMSTERDAM (THE NETHERLANDS)

Particular types of journeys,  
e.g., the school run, are  
much better carried out by  
cycling and walking, instilling  
active lifestyles in the next  
generation. These require  
networks, facilities, and  
appropriate locations of  
activities.

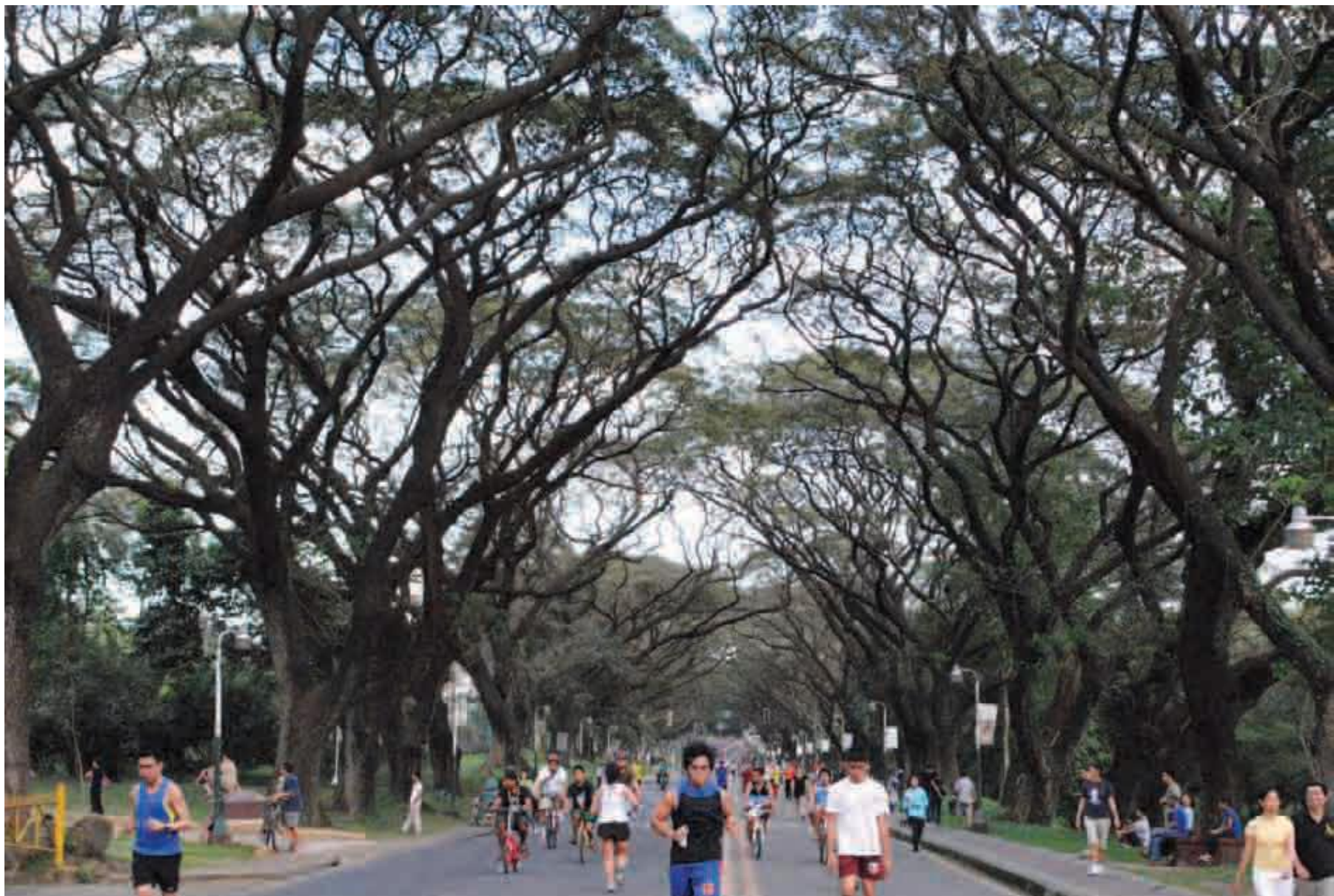


ACHIEVING SUSTAINABLE MOBILITY  
ALSO AIMS AT IMPROVING CITY  
LIVEABILITY.

- “It is frequent that images of high rises and highways are used to portray a city’s advance.
- In fact, in urban terms, a city is more civilized not when it has highways, but when a child on a tricycle is able to move about everywhere with ease and safety.”
- —Enrique Peñalosa, Colombian politician and former mayor of Bogotá



Car-free environments in Zurich (Switzerland)  
Car-free days allow much activity and fun in the city center.



# Singapore: Promoting Walking in tropical countries



## DEVELOPING CAR-FREE AREAS

In Xian (PRC): Many central areas are now being developed as car-free areas or at least car use is restricted.



# Pedestrian and cycle space in central areas make cities more accessible and liveable : XIAMEN (PRC)



# CASE STUDY – COPENHAGEN, DENMARK



The bicycle has become embedded in Danish Society



# Case Study - Copenhagen

## Background

- **1.2 million inhabitants; 2,632 inhabitants per square meter**
- **Bicycles have always been a part of Copenhagen life since the 19<sup>th</sup> century'; the Second World War substantially increased the level of bicycle use**
- **Post-war era until 1960: cars dominated urban policies**
- **High GDP (USD 36,449 per capita)**
- **Turning point 1970:**
  - **oil crisis; growing traffic congestion**
- **Challenge:**
  - **providing affordable transport to all**
  - **redirect their transport policy to one where bicycles would have a predominant role**
  - **comprehensive urban development plan**
- **After 2000, second milestone: more systematic approach to cycling**

# København: reasons for cycling – faster and healthy

## NEW CYCLISTS' REASONS FOR STARTING TO CYCLE

It's faster	51 %
It's more convenient	32 %
It's healthy	31 %
It's cheap	30 %
It feels good/ good way to start the day	20 %

19 % of existent cyclists started cycling more than two years ago and 9 % started cycling within the past two years. 70 % have always cycled.



## HEALTH IMPACTS OF CYCLING – DKK PER CYCLED KM

	Impact on society	Impact on individual cyclist	Total
Health benefits	1.74	3.77	5.51
Accident costs	0.54	0.25	0.79
<b>Total health impact</b>	<b>1.20</b>	<b>3.52</b>	<b>4.72</b>

Source: Copenhagen Bicycle account 2010, Photo Carlosfelipe Pardo

# Advantages of expanding the role of NMT:

“A good city is one where we want to be out in public space...not at home, not in a shopping mall, but in sidewalks, parks, plazas...”

**Jan Gehl, Danish urbanist**

THANKS