Why?

- Urban growth?
- Local constraints: energy, environment, equity
- Global constraints: GHG
- Health of local residents
The Urban Century

Urban and rural evolution of global population

- Global population
- Urban population
- Rural population

Timeline: 1950 to 2050

- 30% Urban (1950)
- 50% Urban (2000)
- 70% Urban (2050)

Billions
Ecological Footprints & Human Development Index by country

Source: LSE
Urban Transport India: 2040

- ~40% urbanization; 600-680 m people
- ~USD 15000 per capita urban income
- Car ownership: 100-150/1000 persons
  - Small cars
  - Public transport
- Vehicle ownership: 300-500/1000 persons
  - MTW
  - Small cars
  - Buses
- ~90m cars; 270m vehicles
Our history
Urban Transport and Urbanisation

• I. 1950-1970
  – < 20% urbanisation, focus rural development, masterplanning initiated in some cities (US aided)
  
  – Central govt initiative for shelter policies, 1956 Slum Area clearance act passed

  – NMV share ~60 % urban transport

Built Environment Symposium, 2-3 September, 2011 Alpbach, Austria
II. 1970-1990

- Formation of slums recognized as a problem (formation of TN Slum Clearance Board, 1971)
- Controlled by ruling party: orientation away from eviction and resettlement
- WB entry into Urban sector funding (1975)
- Delink the TNSCB from political influence
deregulation of markets, privatisation of municipal services, cost recovery, land tenure
II. 1990 onwards

- Extending banks recommendation from Chennai to other cities: create serviced plots in large scale sites, increase the interest rate for that slum dwellers paid for mortgages
- 1980- city beautification scheme, slum eviction throughout the city, parking lots made in place of slums
- WB records show improved slums for 76,000 households, at less than half the cost of tenement construction
Large number of people relocated for metro and other development projects

Converting walking trips to motorised trips - buses, RTVs, LCVs

Long cycling trips

Time poverty of women increases

Opportunity for "self employed" business reduces
Increase in travel cost and travel time
Persons killed in road traffic crashes in India, thousand

- Estimated 1,650,000 hospitalised in 2006

Source: NCRB, 2007
Modal share trends in BAU 2007-2031

BAU: Road expansion in cities
investment in rail based public transport

Bus and NMV share expected to decrease (~25% & 30%)

Car and two wheelers expected to increase (~20% and 25%)
Delhi: Alternative scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>DALYs per million population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower emission motor vehicles</td>
<td>1500</td>
</tr>
<tr>
<td>Increased active travel</td>
<td>13000</td>
</tr>
<tr>
<td>Combination</td>
<td>13000</td>
</tr>
</tbody>
</table>
## Delhi: Health impacts by cause

<table>
<thead>
<tr>
<th>Cause</th>
<th>Change in disease burden</th>
<th>Change in premature deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischaemic heart disease</td>
<td>11-25%</td>
<td>2490-7140</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>11-25%</td>
<td>1270-3650</td>
</tr>
<tr>
<td>Road traffic crashes</td>
<td>27-69%</td>
<td>1170-2990</td>
</tr>
<tr>
<td>Diabetes</td>
<td>6-17%</td>
<td>180-460</td>
</tr>
<tr>
<td>Depression</td>
<td>2-7%</td>
<td>NA</td>
</tr>
</tbody>
</table>
Reclaiming spaces for people: *Lessons for sustainable mobility plans*

- Modal shares in favour of NMT and PT is more effective than technology alone:
  - Retain PT and NMT trips
- PT and NMT must be integrated
- Pedestrians and cyclists have the right to direct, pleasant and safe routes
- Restrict private motor vehicles:
  - speed, road space and convenience
Constraints?
European qualified Transport Planners after 1970 discovered the roots of European Transport Planning – the people, the goods.

Bus - PC 25% Occupancy

......and the real capacity of a lane.
Landuse policy can influence the following dimensions to influence urban air pollution (Gwilliam, Kojma. Johnson, 2004):

- **Density**: policy that increases or maintains the population density
- **Structure**: policies that favour the concentration of employment and retail activity
- **Diversity**: traditional separation of landuses has become a net source of airpollution
- **Local Design**: Cities can reduce pollution from short car trips by good design of local facilities for nonmotorized transport

These address the ‘formal’/’planned’ sector in cities. 30%-70% urban population remains outside this discussion.
Landuse –transport integration for ‘unplanned’ sector implies:

- **Density**: High rise buildings vs small houses (12-18sqm)
- **Structure**: Monocentric/polycentric vs street vendors
- **Diversity**: Mixed landuse vs informal markets
- **Local Design**: Short car trips vs walking/bicycling trips
Landuse-Transport integration for sustainable cities

• Integrating diverse socio economic households in master plan
• Street designs and transport system to ensure current and potential walking and bicycling trips
• Lessons- indicators and methods from self organising cities.
sustainable safe traffic system

• a road environment with an infrastructure adapted to the limitations of the road user;

• vehicles equipped with technology to simplify the driving task and provided with features that protect vulnerable and other road users; and

• road users that are well informed and adequately educated.

Retrofitting cities: Traffic Calming, roundabouts
Traffic Safety Science in its infancy

- Counterintuitive results: marked pedestrian crossings increased fatalities by 20% compared to unmarked, raised crossings decreased fatalities by 40% (Hyden et al)
- Drivers speed increase near a zebra crossing (Varhelyi, A, 1999)
- Poor understanding of city structures and pedestrian behaviour: pedestrian exposure
- Pedestrian safety requires safe cities, safe traffic system is a subset
Conflict between safety and mobility

- Higher level of service implies higher speeds—i.e., higher probability of fatality

*Capacity.*

**v/c ratio based on 2000 pass, cars/hr/lane valid only for 60- and 70-mile/hr design speeds.
Design- where is the space?
Proposed section

18.0m ROW / One way street / Road no. 8

Plan
NON arterial roads and small cities
Speed control by traffic calming
Safe accessible bicycle lanes

0 bicycle accidents since May08 (10 months)
Safe urban road

Bicycle lane and Midblock bus shelter (single platform)

~1500 bicycles/h

At grade pedestrian crossing
Guiding Principles

• Road geometric standards from Buses/VRUs perspective
• Traffic management policies that enable safe mobility of VRUs
• Road side vendors/ informal sector to be viewed as service providers
Pedestrian Bridge ~ 6-8 m high

- increases walking distance by 100-200 m
- Discourages use of Public transport
- More motorcycles and cars leading to congestion and high risk in off peak hours
Transport challenges in Urban India

Development and modernity is associated with technology (fuel, automobile, metro rail)

External financing favours large construction projects (metro vs buses)

Zero emission modes, walking and cycling have no “market value” i.e. financing through land development or loans not possible, hence no takers!

Successful public transport projects are those which do not affect the cars adversely not just benefiting the bus commuters!