Part 1

Road uses and policy objectives
Movement

People (travelling by car, bus, taxi, motorbike, cycling, walking)

Goods (by vans, trucks, cargo cycles)
Movement – also on tracks

Movement – also across the road
‘Place’

[Images of street scenes]
The road is an ecosystem

Economic objectives

Increasing accessibility of people and freight vehicles

..stimulates the economy
Social objectives

Achieving a more sustainable modal split (fewer cars) and providing better conditions for pedestrians and ‘place’ improves:

- Safety (from traffic)
- Safety (from crime)
- Social interaction
- Physical activity
- Stress

Environmental objectives

Achieving a more sustainable modal split (fewer cars) and providing greenery improves:

- Noise
- Air and water pollution
- Visual environment
- Local climate
- Energy consumption
- CO₂ emissions
Example of problems caused by car traffic on car users

Congestion

Example of problems caused by car traffic on residents

Severance

Appleyard and Lintell (1972)
Which way to go?

Responsibility of different agencies

But roads are connected, so are their impacts
Part 2

Road design

Different design elements can be used
**Principle: design for speeds of intended users**

60 km/h

3-5 km/h

0 km/h

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**Lanes can be for a specific use**
..or for shared use

Lanes can be placed in different positions
The median strip can be used for many things

Designs to reduce speeds
Kerbside space for specific types of ‘place’ activities

Design elements can be placed at different angles
Different options to provide more greenery

Access to underground utilities

On footway ..or on carriageway
Different types of crossing facilities

...or not allowing pedestrians to cross

Time-based solutions
Dynamic solutions
Part 3

The usual type of road classification
Hierarchical system based on importance for movement
New classification: 
Dual function of roads: link & place

Objective: save time

Objective: spend time

Link & Place matrix

Each cell represents a road type, with a specific combination of Link & Place status level.
Different segments of the same road can have different classification

Two road segments
Same width
Different Link & Place status
Different designs
The same road can have different classification at different times.

The classification affects the speed the road is designed for.
Example

Link & Place classification of the road network of Havana (Cuba)

Done in workshops with local residents

Levels based on geographic scale
Output: a new road classification for Havana

Why is it useful?

To identify needs for redesign

This road has high link AND high place status

But it is designed mainly as a link, not as a place
Part 4

Roadspace allocation

Width must be allocated
The roadspace allocation process

Modelling

- Movement
- Stationary (parking/loading, people sitting, etc.)

Options → Consultation → Appraisal → Political priorities

Option generation → Stakeholder engagement → Decision

State-of-the-art
Innovations

Case studies

© MORE
Option generation tools

Tool 1: Roadspace allocation

Tool 2: Road design

https://ifpedestrians.org/roadoptions/public

Input 1: Road use priorities

Choose from the green dropdown menus the degree of priority of each type of road user or road use

- 0 Can be worse off than now, if needed
- 1 Should not be worse off than now
- 2 Should be better off than now

Choose a maximum of 3 road uses with level 1
Choose a maximum of 3 road uses with level 2

<table>
<thead>
<tr>
<th>Road user</th>
<th>Road use</th>
<th>Road user</th>
<th>Road use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians</td>
<td>Walk</td>
<td>Bus drivers</td>
<td>Move</td>
</tr>
<tr>
<td></td>
<td>Cross the road</td>
<td>Bus passengers</td>
<td>Sleep</td>
</tr>
<tr>
<td></td>
<td>Stnl</td>
<td>Rail/metro/bus passengers</td>
<td>Interchange</td>
</tr>
<tr>
<td></td>
<td>Slt (street furniture)</td>
<td></td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Slt (sidewalk)</td>
<td>Car drivers</td>
<td>Move</td>
</tr>
<tr>
<td>Pedestrians with restricted mobility</td>
<td>Walk</td>
<td>Car share users</td>
<td>Move</td>
</tr>
<tr>
<td></td>
<td>Cross the road</td>
<td>Motorcycles</td>
<td>Move</td>
</tr>
<tr>
<td>Cyclists</td>
<td>Move</td>
<td>Taxi drivers (inc. ride-hailing)</td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Park</td>
<td>Taxi passengers (inc. ride-hailing)</td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Rent (dock)</td>
<td>Goods vehicles</td>
<td>Move</td>
</tr>
<tr>
<td></td>
<td>Rent (dockless)</td>
<td>Emergency vehicles</td>
<td>Move</td>
</tr>
<tr>
<td>Micromobility users (scooters, skates, etc.)</td>
<td>Move</td>
<td>Service vehicles</td>
<td>Move</td>
</tr>
</tbody>
</table>
Input 2: policy objectives

Fill the checkboxes of the objectives the intervention aims to achieve. Choose only the main objectives (Maximum of 5)

Movement
- Increase number of trips
- Reduce travel time
- Improve travel time reliability
- Reduce congestion
- Improve trip quality
- Achieve a more sustainable modal split

Place
- Facilitate place activities (e.g. people sitting)
- Facilitate kerbside activities
- Improve access to local buildings

Road operation
- Improve resilience (to weather conditions)
- Increase flexibility (to different road uses)

Wider objectives: economic
- Reduce costs of transport
- Promote local economy

Wider objectives: social
- Improve traffic safety
- Reduce community severance
- Increase personal security
- Promote physical activity/health
- Promote social interaction
- Promote social inclusion
- Increase wellbeing

Wider objectives: environmental
- Increase green space
- Improve air quality
- Reduce noise
- Improve visual environment
- Protect soil/water and reduce flood risk
- Improve local climate
- Reduce energy consumption
- Improve regional/global environment

Main output

POSSIBLE INTERVENTIONS

+ Pedestrianisation
+ Part-time pedestrianisation
+ Footways
+ Greenways
+ Widen footway
+ Raised/kerbed footway
+ Add or widen median strip
+ Walkable median strip
+ Pedestrian fast/slow lanes

* Scroll to see more interventions
* Click on an intervention for further information
* Click the checkboxes of the policies that are feasible in your road section
**Description page**

Add or widen median strip

<table>
<thead>
<tr>
<th>Description</th>
<th>Examples and evidence</th>
<th>Effect on road uses</th>
<th>Effect on policy objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of policy: Space allocation. Also known as central reservation. Space between traffic lanes in different directions. It can be painted, raised with kerbs, or planted. Physical barriers (e.g. guardrails) may be added, or kept, if already existent, to separate vehicles. If the median has no physical barriers, it allows vehicles to pass cyclists or slower vehicles, emergency vehicles to cross over into the opposite lane, and pedestrians to stop and cross in two stages (at crossing facilities or informal crossings). If the median is raised, wide enough, and has few gaps, it also allows pedestrians to walk along the road. Alternatively, it can provide space for place activities (e.g. gardens, events, car parks, intimate outdoor, or downtown furniture).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examples and evidence page**

Add or widen median strip

<table>
<thead>
<tr>
<th>Description</th>
<th>Examples and evidence</th>
<th>Effect on road uses</th>
<th>Effect on policy objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Restricted-access roads (e.g. motorways) and multilane roads usually have wide medians, with barriers at the carriageway edges, and sometimes a grassed strip in the middle.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- In 2015, a long and wide median strip was added to Avenida 9 de Julio in Buenos Aires (one of the widest urban streets in the world), with a busway, greenery, and pedestrian paths.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The space between Carretera 7 and Calle 33 in central Bogota is a wide median accommodating a cycle lane, several clear paths for pedestrians, benches, a planted strip, and a station entrance.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Evidence**

- The redesign of a 4-lane road in New Jersey, adding a raised median, reduced pedestrian exposure risk and increased driver predictability, and little effect on traffic speed and volume. See: King et al. 2003 Pedestrian safety through a raised median and redesigned intersections. Transportation Research Record 1628.

**Effect on road uses page**

Add or widen median strip

<table>
<thead>
<tr>
<th>Description</th>
<th>Examples and evidence</th>
<th>Effect on road uses</th>
<th>Effect on policy objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely impact of intervention on road uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compared to: Do not add or widen median strip</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road user</td>
<td>Road use</td>
<td>Impact</td>
<td>Reason</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>Walk</td>
<td>+</td>
<td>Median strip can be walkable</td>
</tr>
<tr>
<td></td>
<td>Cross the road</td>
<td>+</td>
<td>Can stop in middle of road when crossing</td>
</tr>
</tbody>
</table>

**Effect on objectives page**

Add or widen median strip

<table>
<thead>
<tr>
<th>Description</th>
<th>Examples and evidence</th>
<th>Effect on road uses</th>
<th>Effect on policy objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely impact of policy intervention on objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compared to: Do not add or widen median strip</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective</td>
<td>Impact</td>
<td>Reason</td>
<td></td>
</tr>
<tr>
<td>Movement</td>
<td>Increase number of trips</td>
<td>+</td>
<td>Encourages more walking, easier to cross the road</td>
</tr>
<tr>
<td></td>
<td>Reduce travel time</td>
<td>-</td>
<td>Probably delays to motorised modes</td>
</tr>
<tr>
<td></td>
<td>Increase travel time reliability</td>
<td>-</td>
<td>More probability of queues</td>
</tr>
<tr>
<td></td>
<td>Reduce congestion</td>
<td>-</td>
<td>More probability of recurrent congestion, less space</td>
</tr>
<tr>
<td></td>
<td>Improve trip quality</td>
<td>+</td>
<td>Easier to cross for pedestrians, safer for cars</td>
</tr>
<tr>
<td></td>
<td>Mitigate adverse on pedestrian Motor conflict</td>
<td>-</td>
<td>No evidence on improved on pedestrian conflicts</td>
</tr>
</tbody>
</table>
Option generation tools

Tool 1: Roadspace allocation

Tool 2: Road design

https://ifpedestrians.org/roadoptions/public

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**Input 1: Current situation**

Indicate in the green boxes the road width currently allocated to each design element (counting both sides of the road and the median strip)

- Leave field as 0 if the road does not have that design element
- Insert values in metres
- The total road width should be more than 25m and less than 35m

<table>
<thead>
<tr>
<th>Element</th>
<th>Width (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space for walking</td>
<td>6</td>
</tr>
<tr>
<td>Space for place activities</td>
<td>0</td>
</tr>
<tr>
<td>Green area</td>
<td>0</td>
</tr>
<tr>
<td>Lane for general traffic</td>
<td>12</td>
</tr>
<tr>
<td>Bus lane</td>
<td>0</td>
</tr>
<tr>
<td>Space for cycling</td>
<td>0</td>
</tr>
<tr>
<td>Mixed bus and cycle lane</td>
<td>0</td>
</tr>
<tr>
<td>Space for parking and loading</td>
<td>0</td>
</tr>
<tr>
<td>Tram lanes</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total width</strong></td>
<td><strong>18 metres</strong></td>
</tr>
</tbody>
</table>
**Input 2: Priorities**

Choose from the green dropdown menus the degree of priority of each design element

0: Not relevant in this road (no space provided)
1: Relevant, but not priority (will have some space but not more than now)
2: Relevant and priority (will have at least the same space but more, if possible)

<table>
<thead>
<tr>
<th>Element</th>
<th>1</th>
<th>2</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space for walking</td>
<td></td>
<td></td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Space for place activities</td>
<td></td>
<td></td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Green area</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lanes for general traffic</td>
<td></td>
<td></td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Bus lane</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Space for cycling (cycle lane)</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Space for parking and loading</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tram lines</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The tool will show designs with these widths:
These values are calculated automatically

---

**Output**

Possible Road Designs

Legend:
- Walking
- Place Activities
- Green area
- General purpose
- Bus lane
- Cycling
- Max: cycle/Parking/ loading
- Tram line

Notes:
- All designs include 0.8m kerbstone between the footway and carriageway and a 0.5m frontage zone between features and building frontages.
- The width of a single cycle lane is 2.0m on the carriageway and 2.0m for the footway/hardtail/cycle track.
- The width of a double cycle lane is 3.0m on the carriageway, 3.0m for the carriageway, and 4.0m on the footway/hardtail/cycle track.
- A buffer of 0.5m added between cycle space and moving or parked vehicles and between parked and moving vehicles.

Fill the checkboxes of all options you think are feasible in the road subsection.

---
Stakeholder engagement

Road Design Toolkit
Co-creating new roadspace allocations

National and local road authorities and other stakeholders negotiate to create new designs that fit into the available road width
Improvements to PTV Vissim: multi-function roads

- Moving vehicles
- Parked vehicles
- Signals
- Rail-based modes
- Pedestrians walking
- Pedestrians crossing

Better representation of ‘place’ and pedestrian movement
### Option appraisal tool

**Appraisal**

<table>
<thead>
<tr>
<th>Performance indicator</th>
<th>Unit</th>
<th>Implementation cost</th>
<th>Maintenance/year</th>
<th>Link function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>€</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,000</td>
<td>24,426</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>135,700</td>
<td>90,500</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24,426</td>
<td>24,426</td>
<td></td>
</tr>
</tbody>
</table>

- **Pedestrians**
  - Space: Width available
  - Volume: Flow
  - Speed: Average speed (km/h)
  - Travel time: Average travel time (minutes)
  - Delays: Average delay (minutes/vehicle)
  - Reliability: % of unsatisfied users

- **Cyclists**
  - Space: Width available (dedicated space)
  - Volume: Flow
  - Speed: Average speed (km/h)
  - Travel time: Average travel time (minutes)
  - Delays: Average delay (minutes/vehicle)
  - Reliability: % of unsatisfied users

**Indicators can be monetised** → **Cost-benefit analysis**

**Weights can be assigned** → **Multi-criteria analysis**

Green: best option, for each indicator

Red: option violates a design or environmental standard

- Indicators can be monetised → Cost-benefit analysis
- Weights can be assigned → Multi-criteria analysis
Thank you for your attention!

p.anciaes@ucl.ac.uk