

# Specifying Problems and Identifying Solutions: Drawing on experience & innovative thinking

**21<sup>st</sup> Annual TRICS Conference**

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Holiday Inn, Regents Park**

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# Overview

- Importance of problem solving
- Overview of available methods
- Four DISTILLATE tools:
  - Strategy development (KonSULT)
  - Accessibility planning
  - Street space redesign
  - Community space design
- Conclusions

# Importance of problem solving

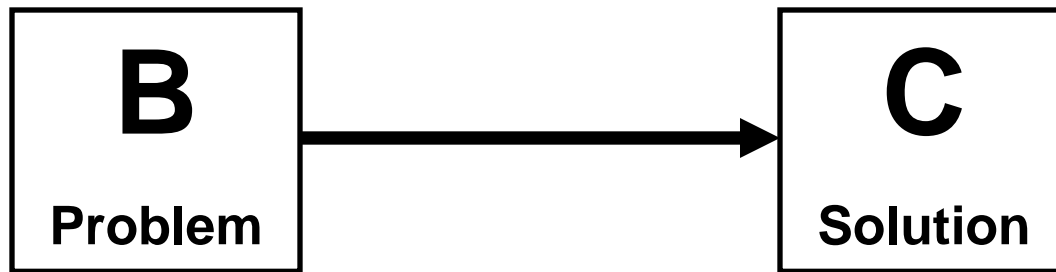
- New NATA Guidance introduces Stage 1 ‘Option Assessment Report’
- While govt. stresses the need to consider alternative solutions, no technical advice offered
  - Main reliance on professional judgment and consultation
- Much resource put into modelling and appraisal – yet ‘best’ outcome limited to options input to the process

# Approaches to option generation

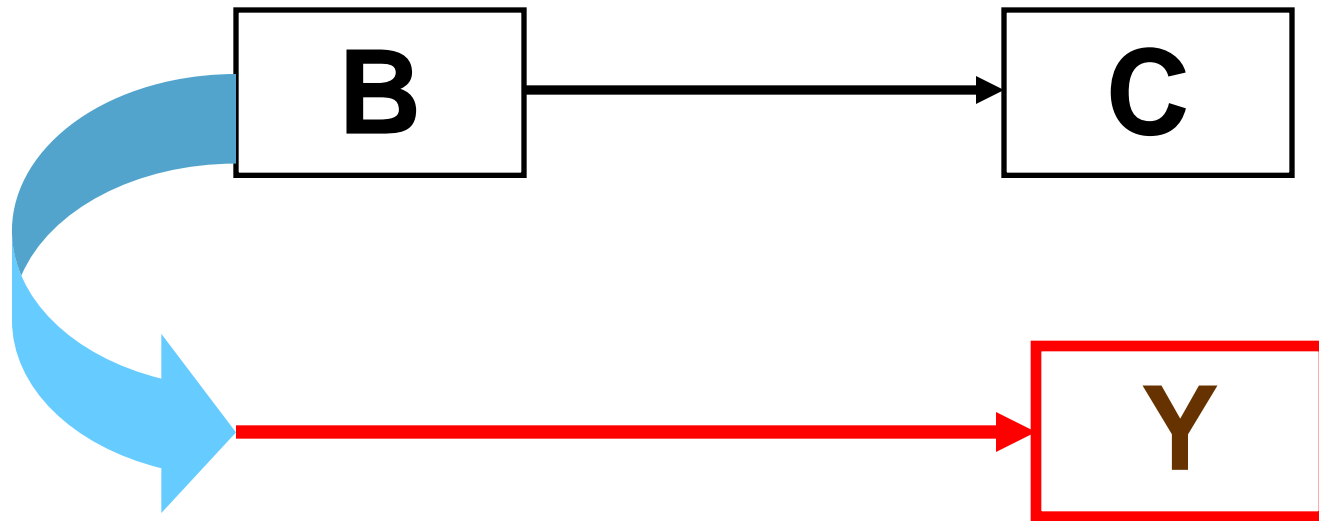
## METHODS FOR OPTION GENERATION

| <b>“INSIDE” THE BOX</b>  |  | <b>“OUTSIDE” THE BOX</b>                                       |                     |
|--|--|--|---------------------|
| Pre-existing options   | Existing parameters, new permutations                        | Generating new forms of options, including some new parameters |                     |
| Select from existing databases/libraries of policy instruments | Morphological Box<br>Analysis: generating (all) combinations | ‘Systematic’ approaches  | ‘Random’ approaches |
| <b>QUANTITATIVE</b>  |  | <b>QUALITATIVE</b>   |                     |

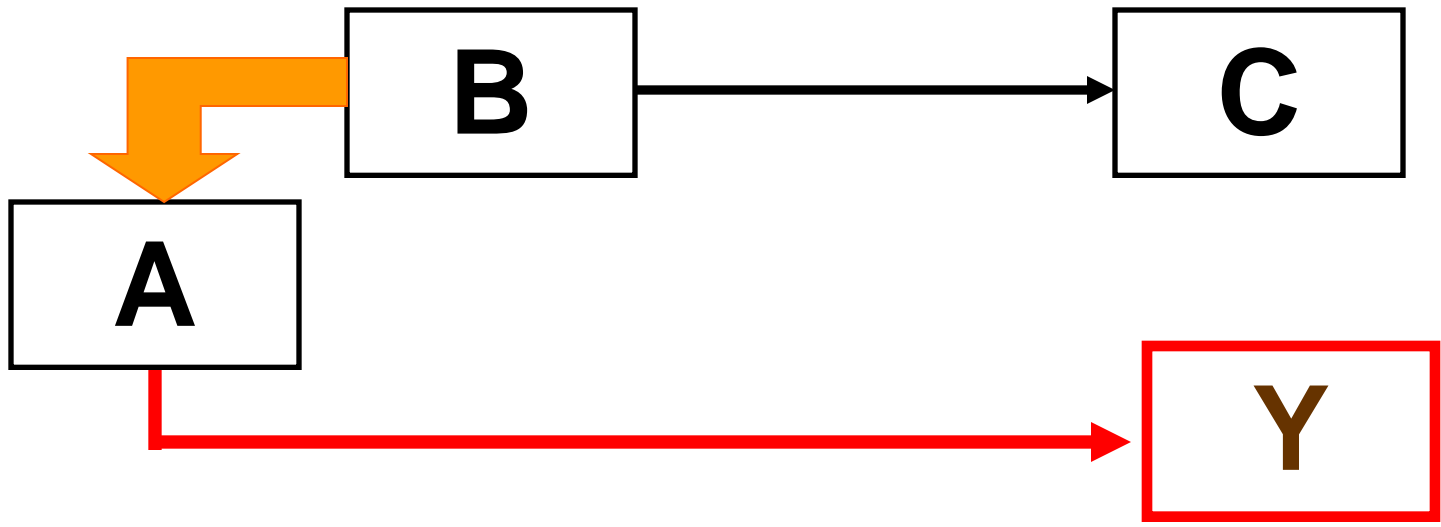
# Normal Thinking Process



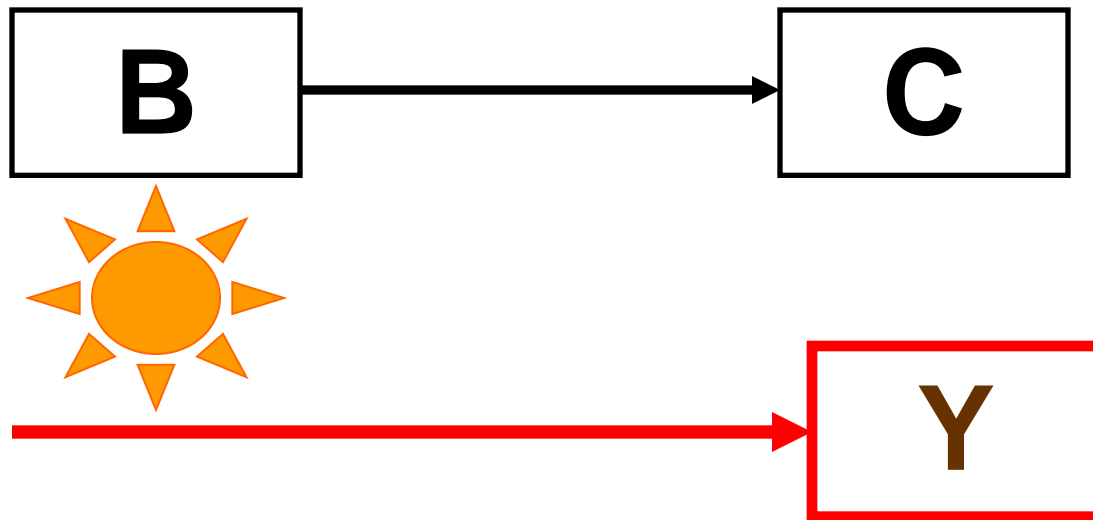
# Innovative Thinking Process



# Ways of Achieving This – 1: Redefine problem



# Ways of Achieving This – 2: Switch solutions track



# Four DISTILLATE OG Products

|                   | Strategies  | Schemes                                      |
|-------------------|---|--|
| 'Inside' the box  | 1: Packages of urban measures [KonSULT]             | 3: Streetspace main road redesign (Bloxwich) |
| 'Outside' the box | 2: Accessibility Planning options (Barnsley Dearne) | 4: Community space design (Blackpool)        |

# 1: KonSULT

## Option generation tool

- KonSULT is a web based knowledgebase developed at the University of Leeds  
<http://www.konsult.leeds.ac.uk>
- Assesses potential contribution of over 40 transport and land use policy instruments, to achieving a range of objectives/ addressing problems
- Uses both a first principles assessment and review of case studies

## KonSULT (cont)

- The option generation tool has been developed to allow users to interrogate the information within the KonSULT database and develop packages of policy instruments
- Users define their local circumstances and requirements, and the software then scores instruments in terms of their suitability – in two steps:

## Step 1

Uses information within KonSULT to assess each policy instrument, based on the criteria supplied by the user. Scores and then ranks each one.

## Step 2

Takes data from Step 1 and adds information on synergy or barriers to create potential packages of pairs of instruments.

# Input Criteria for Step 1

## KonSULT Option Generation Filter

This filter has been developed by the [Institute for Transport Studies, University of Leeds](#)

The filter allows users to create a list of ranked policy instruments based on individual search criteria

To start using the filter, select your user group and area type

SELECT USER GROUP

SELECT AREA TYPE

Decision Makers from National Organisations  
Decision Makers from Regional Organisations  
Local Authority Decision Makers

Any Area Type  
Town or City Centre  
Inner Suburb  
Outer Suburb  
District Centre  
Corridor  
Large Town or City >100K  
Small or Tourist Town <100K

CONTINUE

## Please select policy STRATEGY/STRATEGIES

You can assign weights (1 to 5) to indicate the relative importance of each category you have selected. 1 = low importance, 5 = high importance

Any Strategy

- 1 Reducing the need to travel
- 1 Reducing Car Use
- 1 Improving the Use of Road Space
- 1 Improving the use of Public Transport
- 1 Improving walking and cycling
- 1 Improving Freight

Back

Start over

RUN FILTER

Please select PROBLEMS, OBJECTIVES OR INDICATORS.

You can assign weights (1 to 5) to indicate the relative importance of each category you have selected. 1 = low importance, 5 = high importance

Objectives

Problems

Indicators

- 1 Efficiency
- 1 Liveable streets
- 1 Protection of the environment
- 1 Equity and Social Inclusion
- 1 Safety
- 1 Economic Growth
- 1 Finance

- 1 Congestion
- 1 Community Impacts
- 1 Environmental Damage
- 1 Poor Accessibility
- 1 Social and Geographic disadvantaging
- 1 Accidents
- 1 Suppression of Economic Activity

- 1 Congestion
- 1 Bus reliability
- 1 % of people who think it is easy and safe to walk in their area
- 1 CO2 emissions
- 1 Local pollution
- 1 Energy efficiency ( / trip )
- 1 Accessibility to key services
- 1 Average cost of journey
- 1 Mode share walk
- 1 Mode share cycle
- 1 Safety
- 1 Regional GDP

Back

Start over

CONTINUE

# Example output from Step 1

## Ranked policy instruments based on individual search criteria

| Code | Instrument                   | Score | Cost    | Presentation Options  |
|------|------------------------------|-------|---------|---|
| 607  | Road pricing                 | 81.82 | neutral |   |
| 102  | Development Densities Mix    | 63.64 | high    | Number of policy instruments: <input type="text" value="42"/>     |
| 403  | ITS                          | 61.82 | high    | Minimum score: <input type="text" value="-100"/>                  |
| 402  | UTC                          | 58.18 | medium  | Show only instruments with cost: <input type="text" value="All"/> |
| 305  | Light Rail Systems           | 49.09 | high    | Show only instruments of type: <input type="text" value="All"/>   |
| 301  | Park & Ride                  | 49.09 | high    | Sort instruments by: <input type="text" value="Score"/>           |
| 412  | Lorry Fleet Management       | 47.27 | medium  |   |
| 100  | PT Focused Development       | 47.27 | high    |   |
| 406  | Regulatory Restrictions      | 45.45 | low     |   |
| 201  | Company Travel Plans         | 43.64 | medium  |   |
| 303  | New Rail Stations            | 43.64 | high    |   |
| 413  | Bus Fleet Management Systems | 41.82 | medium  |   |
| 405  | Parking Controls             | 40.00 | low     |   |
| 604  | Fare levels (decrease)       | 40.00 | medium  |   |
| 306  | Cycle Routes                 | 40.00 | high    |   |
| 400  | Accident Remedial            | 40.00 | medium  |   |
| 600  | Private parking charges      | 36.36 | neutral |   |
| 205  | Ride Sharing                 | 36.36 | medium  |   |
| 300  | Guided Bus                   | 36.36 | high    |   |

# Example output from step 2



Option Generator output (UG v1.3U ~ file saved 13/09/2007 09:33:00)

KonSULT input file: optgen.txt

Interaction matrix file: c\_matrix1.csv

Policy instruments selected: 9

Unique combinations: 36

| Rank | Combin  | Instrument1               | Score1 | Cost1  | Rank1 | Category1      | Instrument2               | Score2 | Cost2   | Rank2 | Category2      | Combin-ed Score | Matrix Score | Total Score |
|------|---------|---------------------------|--------|--------|-------|----------------|---------------------------|--------|---------|-------|----------------|-----------------|--------------|-------------|
| 1    | 403&607 | ITS                       | 61.82  | high   | 3     | Management     | Road pricing              | 81.82  | neutral | 1     | Pricing        | 143.64          | -5           | 138.64      |
| 2    | 402&607 | UTC                       | 58.18  | medium | 4     | Management     | Road pricing              | 81.82  | neutral | 1     | Pricing        | 140             | -5           | 135         |
| 3    | 102&607 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | Road pricing              | 81.82  | neutral | 1     | Pricing        | 145.46          | -20          | 125.46      |
| 4    | 412&607 | Lorry Fleet Management    | 47.27  | medium | 8     | Management     | Road pricing              | 81.82  | neutral | 1     | Pricing        | 129.09          | -5           | 124.09      |
| 5    | 406&607 | Regulatory Restrictions   | 45.45  | low    | 9     | Management     | Road pricing              | 81.82  | neutral | 1     | Pricing        | 127.27          | -5           | 122.27      |
| 6    | 305&607 | Light Rail Systems        | 49.09  | high   | 6     | Infrastructure | Road pricing              | 81.82  | neutral | 1     | Pricing        | 130.91          | -10          | 120.91      |
| 7    | 201&607 | Company Travel Plans      | 43.64  | medium | 10    | Attitudes      | Road pricing              | 81.82  | neutral | 1     | Pricing        | 125.46          | -10          | 115.46      |
| 8    | 100&607 | PT Focused Development    | 47.27  | high   | 7     | Land Use       | Road pricing              | 81.82  | neutral | 1     | Pricing        | 129.09          | -20          | 109.09      |
| 9    | 102&403 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | ITS                       | 61.82  | high    | 3     | Management     | 125.46          | -20          | 105.46      |
| 10   | 102&402 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | UTC                       | 58.18  | medium  | 4     | Management     | 121.82          | -20          | 101.82      |
| 11   | 305&403 | Light Rail Systems        | 49.09  | high   | 6     | Infrastructure | ITS                       | 61.82  | high    | 3     | Management     | 110.91          | -10          | 100.91      |
| 12   | 305&402 | Light Rail Systems        | 49.09  | high   | 6     | Infrastructure | UTC                       | 58.18  | medium  | 4     | Management     | 107.27          | -10          | 97.27       |
| 13   | 201&403 | Company Travel Plans      | 43.64  | medium | 10    | Attitudes      | ITS                       | 61.82  | high    | 3     | Management     | 105.46          | -10          | 95.46       |
| 14   | 102&305 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | Light Rail Systems        | 49.09  | high    | 6     | Infrastructure | 112.73          | -20          | 92.73       |
| 15   | 201&402 | Company Travel Plans      | 43.64  | medium | 10    | Attitudes      | UTC                       | 58.18  | medium  | 4     | Management     | 101.82          | -10          | 91.82       |
| 16   | 102&412 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | Lorry Fleet Management    | 47.27  | medium  | 8     | Management     | 110.91          | -20          | 90.91       |
| 17   | 402&403 | UTC                       | 58.18  | medium | 4     | Management     | ITS                       | 61.82  | high    | 3     | Management     | 120             | -30          | 90          |
| 18   | 100&403 | PT Focused Development    | 47.27  | high   | 7     | Land Use       | ITS                       | 61.82  | high    | 3     | Management     | 109.09          | -20          | 89.09       |
| 19   | 102&406 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | Regulatory Restrictions   | 45.45  | low     | 9     | Management     | 109.09          | -20          | 89.09       |
| 20   | 102&201 | Development Densities Mix | 63.64  | high   | 2     | Land Use       | Company Travel Plans      | 43.64  | medium  | 10    | Attitudes      | 107.28          | -20          | 87.28       |
| 21   | 305&412 | Light Rail Systems        | 49.09  | high   | 6     | Infrastructure | Lorry Fleet Management    | 47.27  | medium  | 8     | Management     | 96.36           | -10          | 86.36       |
| 22   | 100&402 | PT Focused Development    | 47.27  | high   | 7     | Land Use       | UTC                       | 58.18  | medium  | 4     | Management     | 105.45          | -20          | 85.45       |
| 23   | 305&406 | Light Rail Systems        | 49.09  | high   | 6     | Infrastructure | Regulatory Restrictions   | 45.45  | low     | 9     | Management     | 94.54           | -10          | 84.54       |
| 24   | 201&305 | Company Travel Plans      | 43.64  | medium | 10    | Attitudes      | Light Rail Systems        | 49.09  | high    | 6     | Infrastructure | 92.73           | -10          | 82.73       |
| 25   | 100&102 | PT Focused Development    | 47.27  | high   | 7     | Land Use       | Development Densities Mix | 63.64  | high    | 2     | Land Use       | 110.91          | -30          | 80.91       |
| 26   | 201&412 | Company Travel Plans      | 43.64  | medium | 10    | Attitudes      | Lorry Fleet Management    | 47.27  | medium  | 8     | Management     | 90.91           | -10          | 80.91       |
| 27   | 201&406 | Company Travel Plans      | 43.64  | medium | 10    | Attitudes      | Regulatory Restrictions   | 45.45  | low     | 9     | Management     | 89.09           | -10          | 79.09       |
| 28   | 403&412 | ITS                       | 61.82  | high   | 3     | Management     | Lorry Fleet Management    | 47.27  | medium  | 8     | Management     | 109.09          | -30          | 79.09       |
| 29   | 403&406 | ITS                       | 61.82  | high   | 3     | Management     | Regulatory Restrictions   | 45.45  | low     | 9     | Management     | 107.27          | -30          | 77.27       |
| 30   | 100&305 | PT Focused Development    | 47.27  | high   | 7     | Land Use       | Light Rail Systems        | 49.09  | high    | 6     | Infrastructure | 96.36           | -20          | 76.36       |
| 31   | 402&412 | UTC                       | 58.18  | medium | 4     | Management     | Lorry Fleet Management    | 47.27  | medium  | 8     | Management     | 105.45          | -30          | 75.45       |
| 32   | 100&412 | PT Focused Development    | 47.27  | high   | 7     | Land Use       | Lorry Fleet Management    | 47.27  | medium  | 8     | Management     | 94.54           | -20          | 74.54       |
| 33   | 402&406 | UTC                       | 58.18  | medium | 4     | Management     | Regulatory Restrictions   | 45.45  | low     | 9     | Management     | 103.63          | -30          | 73.63       |

## 2: Accessibility Planning

Development of spreadsheet tool:

- To collate information from resident and professional workshops
- To assist in defining a wide range of types of accessibility problems
- To develop customised options – both ‘inside’ and ‘outside’ the box

# Resident Discussion Group



# Professional Workshop



# Access Problems & Residential Location

|                |                      |
|----------------|----------------------|
| <b>Village</b> |                      |
| <b>Service</b> | Hospital Outpatients |

|   | At Home | In Villages | Wider Area                        |  |   |
|---|---------|-------------|-----------------------------------|--|---|
|   |         |             | Direct Access by Public Transport | Access via Interchange by Public Transport |   |
| <b>Information, Quality and Availability</b><br><input type="button" value="Add Access Issue"/> <input type="button" value="Clear List"/> |         |             |                                   |  | Lack of Internet Access<br>Poor Quality of Service<br>Lack of Information about Public Transport  |
| <b>Walking and Street Environment</b><br><input type="button" value="Add Access Issue"/> <input type="button" value="Clear List"/>        |         |             |                                   |  | Personal security concerns – poor lighting<br>Cars drive too quickly on residential streets<br>Personal security concerns – groups hanging around |
| <b>Cost of Transport</b><br><input type="button" value="Add Access Issue"/> <input type="button" value="Clear List"/>                     |         |             |                                   |  | Need to buy additional ticket when interchange<br>Can't use pass on different operators on same route   |
| <b>Public Transport</b><br><input type="button" value="Add Access Issue"/> <input type="button" value="Clear List"/>                      |         |             |                                   |  | Limited routes<br>Low frequency<br>Limited/uncertain access for buggies and wheelchair<br>Intimidation at stops/stations and on vehicles          |
| <b>Interchanges</b><br><input type="button" value="Add Access Issue"/> <input type="button" value="Clear List"/>                          |         |             |                                   |  | Uncertainty about making connection<br>Lack of comfortable waiting conditions<br>Lack of information about departure points and timings           |

# Potential 'inside-the-box' solutions

## Walking and Street Environment

### Problem 2: Cars drive too quickly on residential streets

Introduce physical speed reduction measures: speed humps, chicanes

Use of regulations: 20mph speed limits, give way at junctions, park on alternate sides of the street

Enforcement of speed limits

### Problem 3: Unsafe crossing places at junctions

Traffic calming measures on approaches

Ban parking in vicinity of junction

Provide nearby safer crossing places

# Potential 'outside-the-box' solutions

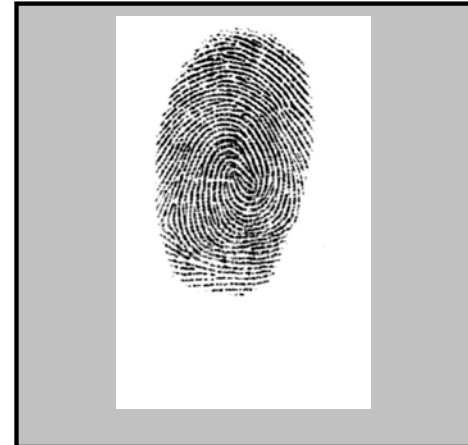
← Previous sheet
Generate New Selection
Export to a new workbook



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## Walking and Street Environment

Idea 1:



# 3: Streetspace Redesign: Background

- Urban street design often causes major controversy – difficult to gain public support
- Conventionally engineers develop a preferred solution, which goes to consultation
- Little attention paid to options:
  - Which street design elements are included?
  - How many and when?
  - Where are they located?

## The Tools: 'Blocks' & 'Bytes'

- For use in more complex streets, where have many competing street user groups
- Two complementary techniques:
  - Physical design exercise with local communities: scale plans, blocks, acetates
  - Conversion to electronic, GIS format, for use in larger public meetings and for developing engineering drawings

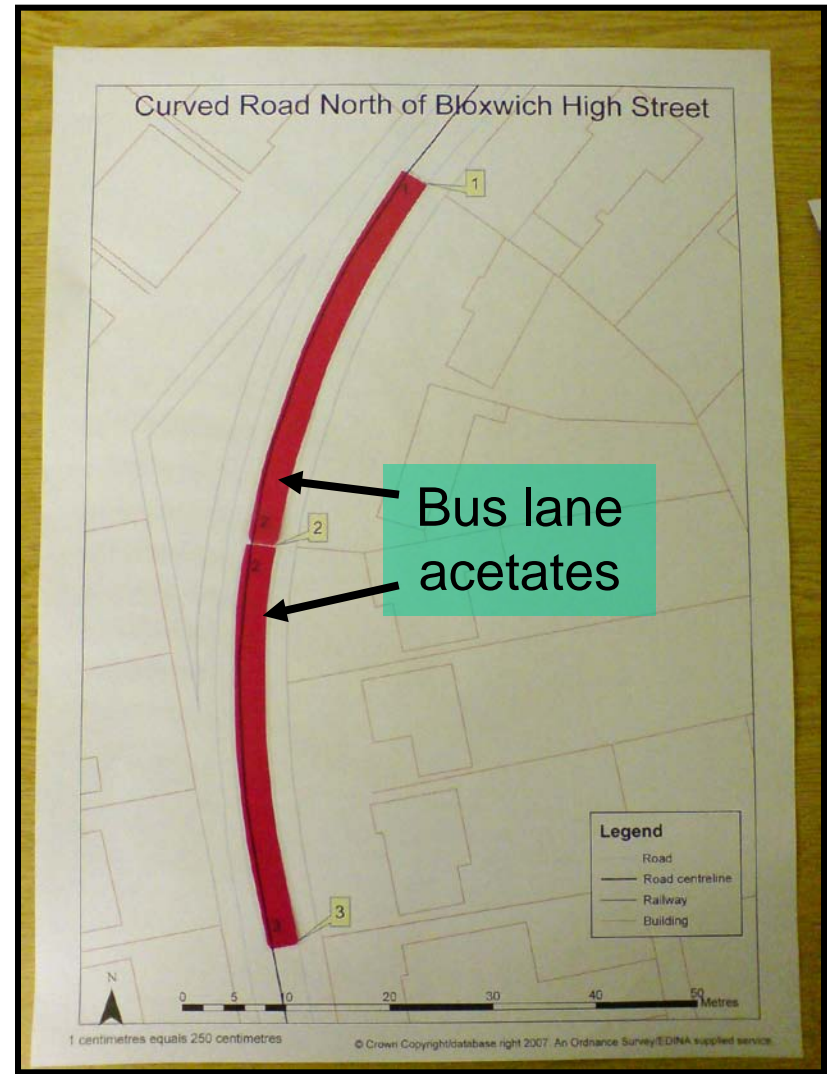
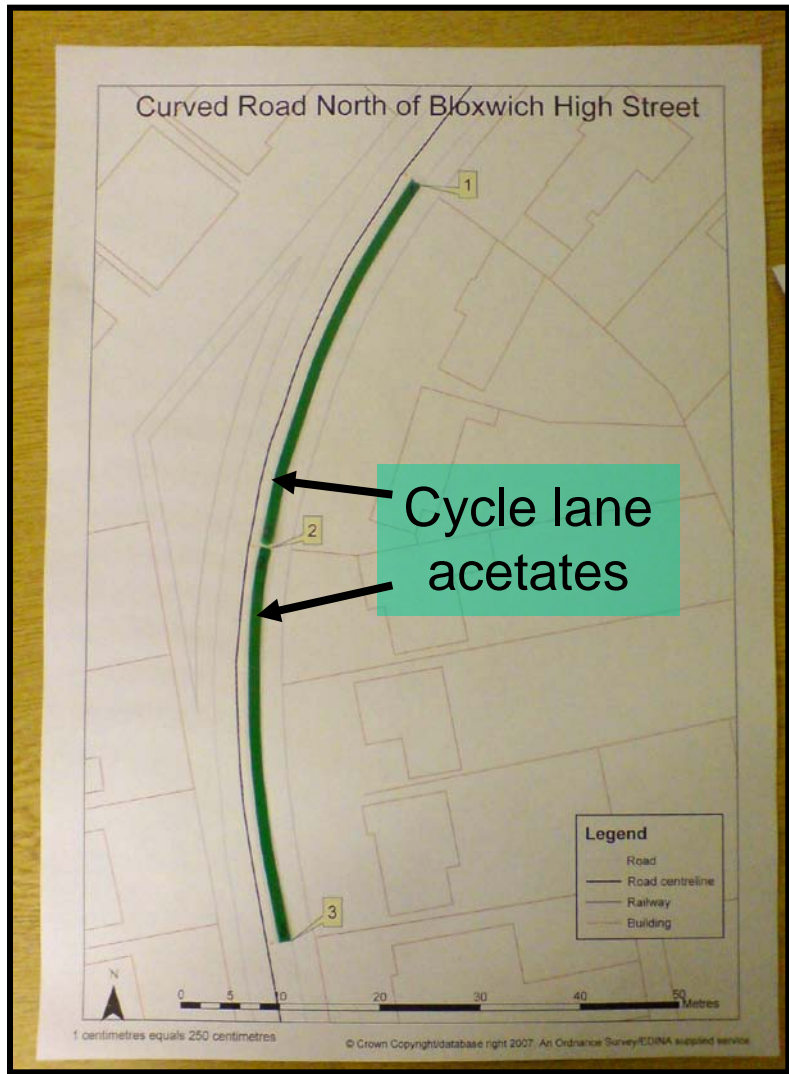
# Tool 1 - Blocks

- By using blocks to scale, and detailed maps of the high street:
  - Users are made aware of many of the component options for allocating street space
  - They then generate their own options, by combining blocks in different ways and locations
  - Maps to scale allow users to work within the constraints that the engineers, face without having to have a detailed knowledge.

# Example of loading bay block



# Cycle Lane and Bus Lane Acetates



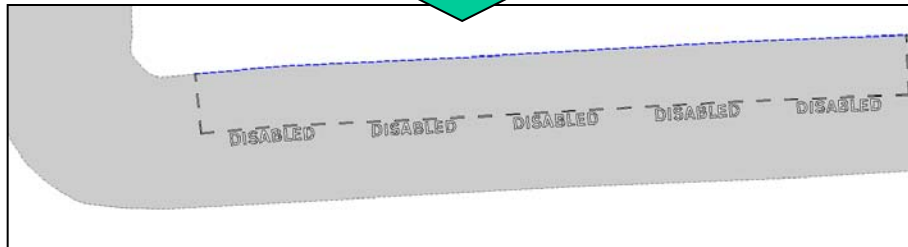
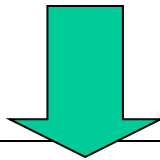
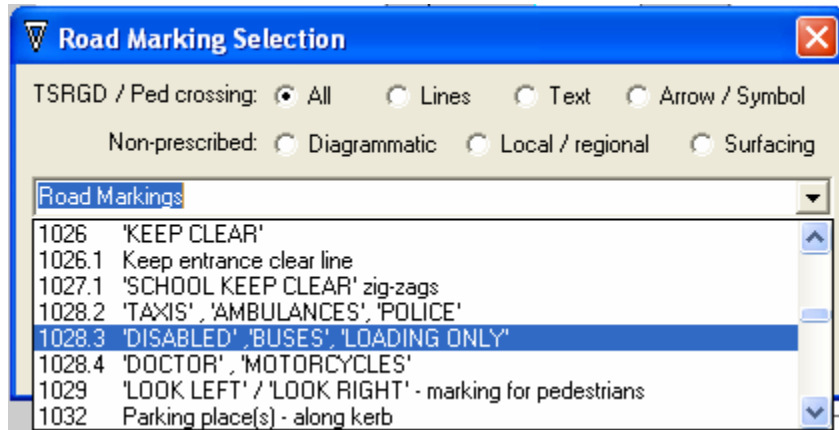


## Tool 2 - Bytes

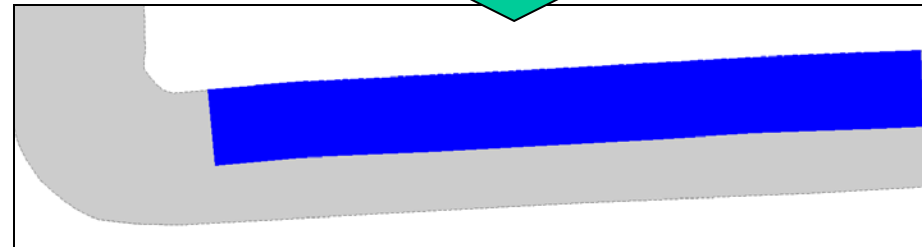
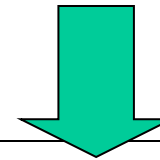
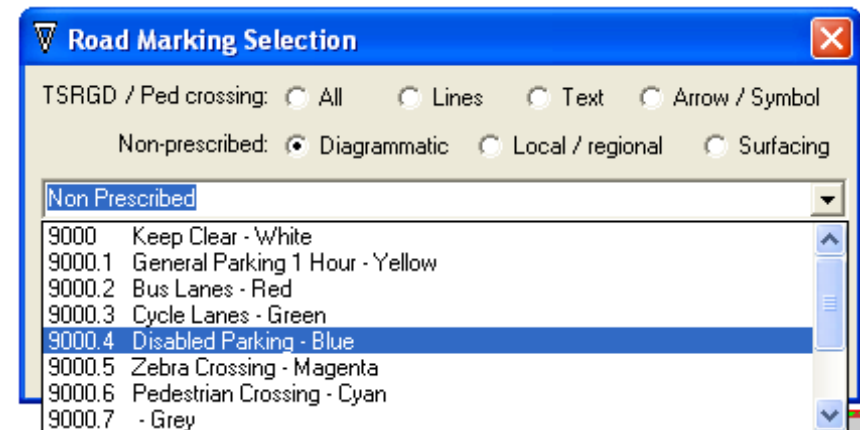
- Based on a development of LineMap, a GIS based tool developed by Buchanan Computing to plot road markings
- The software plots all road markings from Traffic Signs Regulations and General Directions (TSRGD) 2002
- Now converts to/from the block format, and can be edited on screen

# Example: Plotting disabled bays

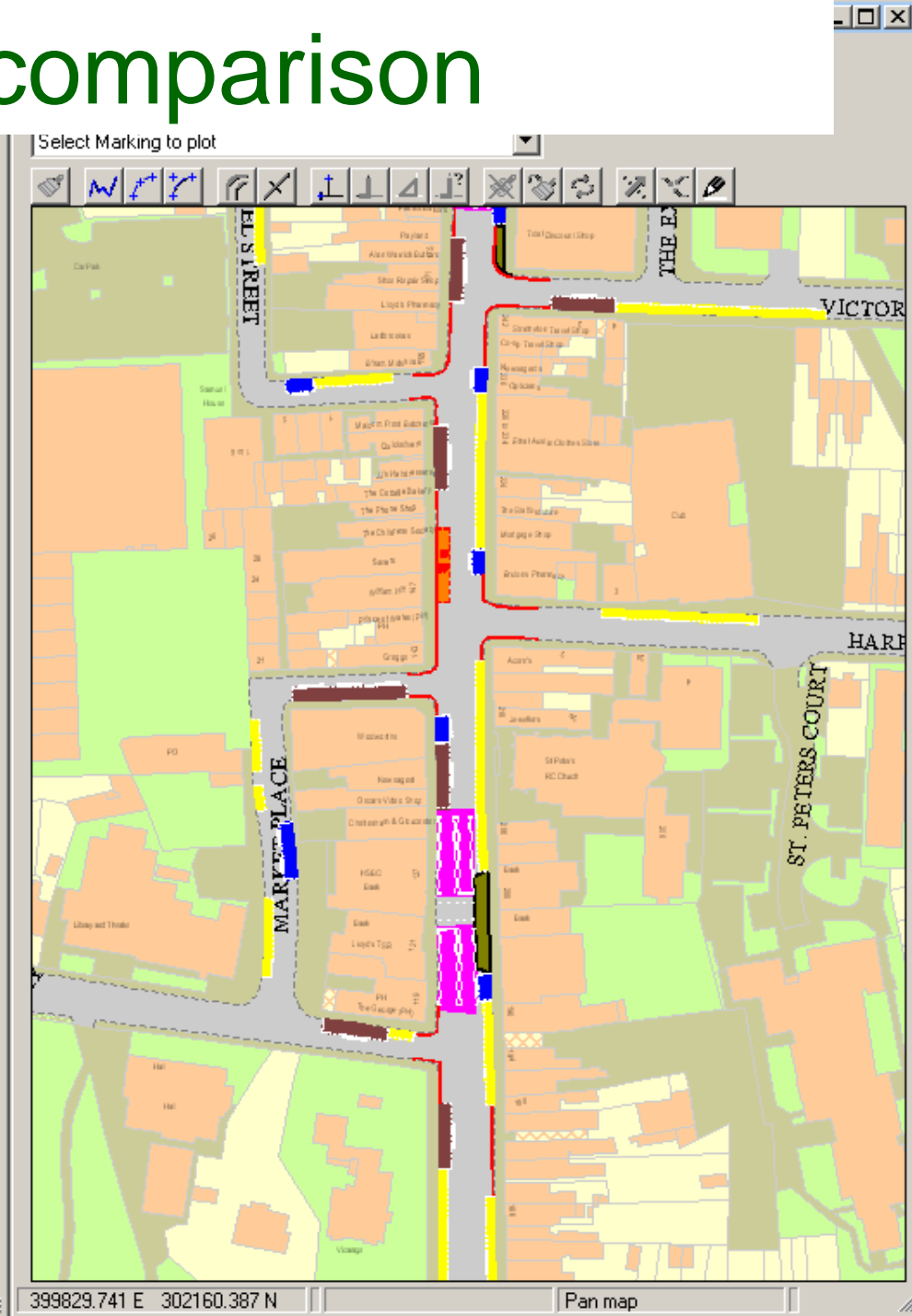
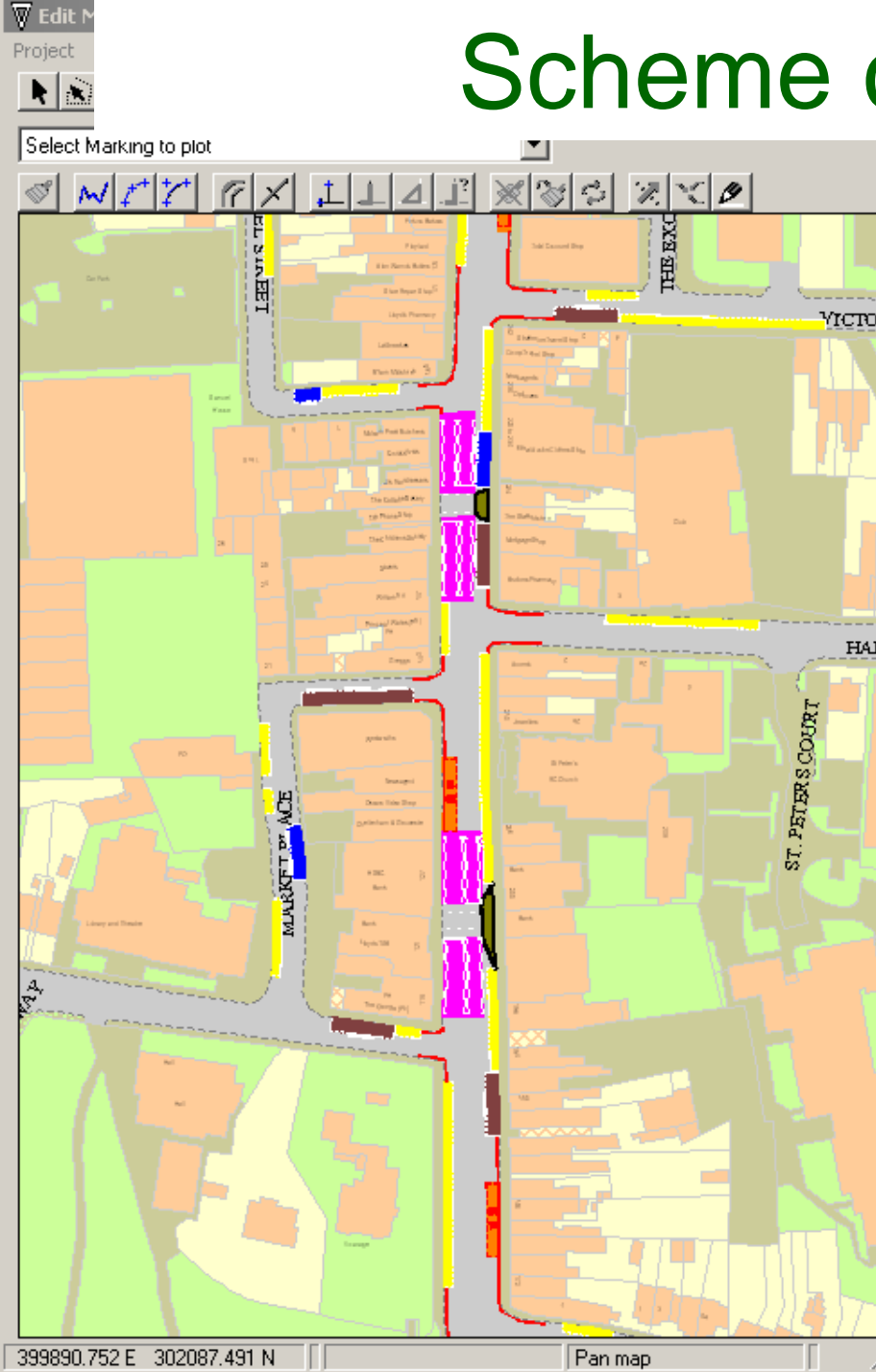
## TSRGD diagram



## Coloured polygon



# Scheme comparison



# Conversion: Blocks -> Lines









# 4: Community Space Design: Rapid Participatory GIS



# Problem features:

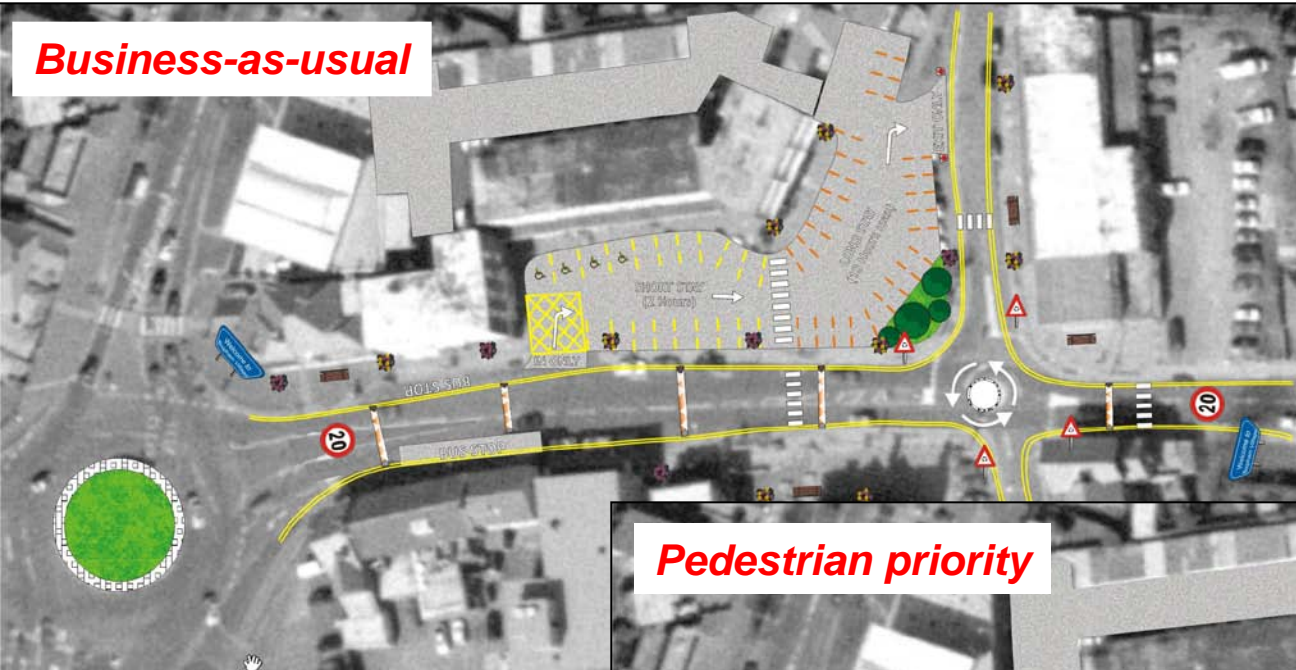
# What do people want to see changed?



| Total   | Comments |
|---|----------|
| by People   |          |
|  | 0 - 5    |
|  | 5 - 10   |
|  | 10 - 15  |
|  | 15 - 20  |
|  | 20 - 25  |
|  | 25 - 30  |

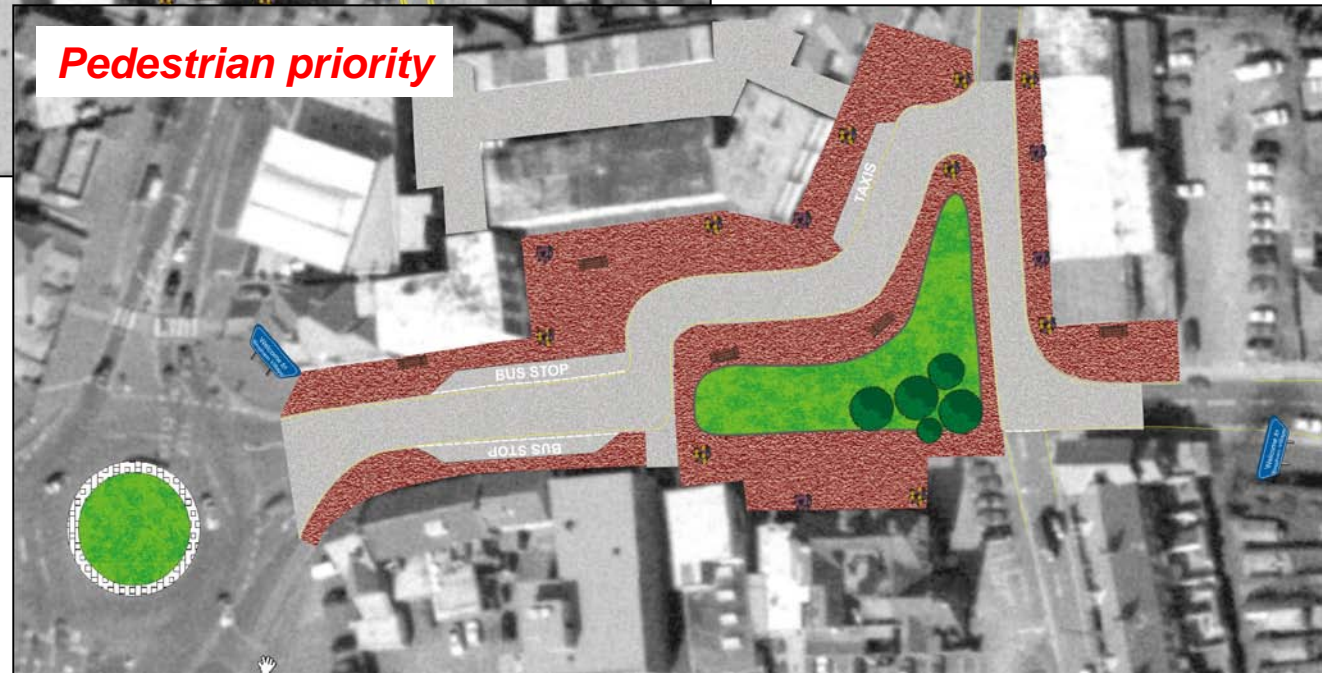
# Future changes: What do people want to see happen?

**Business-as-usual**



minor infrastructure improvements

**Pedestrian priority**



Major changes to promote community use of the space

# Out-of-the-Box options

- Participants were encouraged to consider and justify their suggestions
- They were guided through this using flow chart
- This helped to identify alternative ‘out-of-the-box’ solutions

*For example:*

*What would you change?*

*Improve the car park*

*How?*

*More disabled bays and better signage*

*Why do you want this change?*

*Improve safety of users*

*How else could you make the area feel safer?*

*Stop the kids hanging around*

*How would you do to achieve this?*

*Put in facilities for kids*

- So a ‘solution’ to a ‘transport’ issue – might be better play facilities

# Conclusions

- Very little effort has gone into option generation – yet this predetermines outputs from modelling and appraisal
- New policy challenges require much more innovative ideas – past solutions not sufficient
- DISTILLATE has added four new OG tools, at strategy and scheme level