The CityMobil Business Case Tool

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by: David Jeffery, TRG
Purpose of the BCT

- To provide a quick and simple means for assessing the economic justification for a new scheme
Basis

• Literature review to:
• identify the various factors that must be taken into account
• and
• Identify and develop a preferred method for taking them into account
Results

- The CityMobil BCT comprising:
- A **Spreadsheet** and **Guidelines**
- Take the user through a structured set of questions to build up a business case
- Compare a new CityMobil (**CM**) system with a conventional alternative system (**CAS**)
CityMobil (CM) Systems
Conventional Alternative System (CAS 1) – the Bus
1. Site description

- requests contextual information that describes:
- the problems to be solved,
- the relevant policy objectives,
- the context
- the physical restraints
2. System description

- requests information about the proposed CM system and the CAS (eg bus) scheme to be compared, including:
- the length of the route or guideway,
- Any facilities needed,
- ratings to reflect an assessment of barriers and risks, and the extent to which the schemes comply with policy objectives.
CAS 2 – the Rickshaw
3. Demand characteristics

- requests information about the likely demand.
- Separate worksheets are provided for the CM and CAS systems.
- Data can be input in passengers per hour in three matrices, one each for the morning, evening and off-peak periods.
4. System operation

- requests operational information about the CM and CAS systems.
- For the CM system, algorithms are provided that enable the user to specify requirements in terms of user needs e.g. waiting times. The system design parameters, such as number and speed of vehicles required, are then obtained automatically.
CAS 3 – Horse & Carriage
5. Benefit estimation

- requests information about:
- proposed passenger fares, subsidies and other sources of revenue
- the discount period and rate to be used in a discounted cash flow analyses.
- also provides an opportunity to include any quantifiable social benefits if they are known, such as savings in user time, accidents, vehicle operating costs etc.
6. Cost estimation

- requests information about system capital costs incurred initially to implement the CM and CAS systems,
- and the annual operating costs incurred subsequently to keep them running
7. Benefit Cost Ratio (BCR)

- brings forward the data and calculations from previous worksheets to compute the benefit-cost ratio. Two figures are provided:
  - a **Business BCR** made up from cash flows only i.e. costs, revenues and other income;
  - a **Total BCR** that includes the cash flows and also the social benefits, such as travel time savings, if they have been input to the spreadsheet.
- All values are present values, i.e. measured over the lifetime of the project.
8. TOAST Comparison

- The Technology Options Appraisal Summary Table provides a methodology for the user to apply his or her professional judgement in order to rate and weight the various unquantifiable benefits such as system reliability, punctuality, image and attractiveness etc... The spreadsheet then uses the rate and weight figures given for each factor to calculate a ranking figure.
9. Results summary

- shows the key features of the alternative systems, including:
  - the types and numbers of the vehicles needed
  - the length of the route
  - if a special guideway is required,
  - the number of stations/stops
  - the average vehicle speeds and passengers waiting times
  - business and total BCR values
  - the TOAST ranking
CAS 4 – Rental bikes
**Useful features**

- Business BCR to satisfy funding partners
- Total BCR to satisfy government partners, if data available
- TOAST to take them into account if not
- Quick answers to ‘what if’ questions eg changes in demand, fares, waiting times etc
- Guidance provided eg on costs of different systems, values of time, emissions etc
BCT Evaluation – Progress

- The BCT was made available for testing in La Rochelle (Sept 08)
- plans included:
- MARS modelling sites (Gateshead, Vienna, Trondheim, Madrid) - done
- Plus, sent to 8 x Ref Grp cities (Alemelo, Antibes, Daventry, Hyvinkää, Limeil-Brevannes, Trondheim, Uppsala, Vienna) – responses from Uppsala & Daventry
- 3 x Demo sites (Castelleon - done, Rome, & Heathrow – still to be done)
**D2.4.2 Application of the BCT**

- Report on:
- use of the BCT to assess the business cases for PRT, CTS & HTB schemes analysed using the MARS model in CityMobil WP2.3 in the cities of:
  - Gateshead (UK)
  - Vienna (A)
  - Trondheim (NO)
  - Madrid (E)
<table>
<thead>
<tr>
<th></th>
<th>Gateshead (1)</th>
<th>Vienna (2)</th>
<th>Trondheim (3)</th>
<th>Madrid (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRT</td>
<td>IC</td>
<td>CTS</td>
<td>Feeds</td>
</tr>
<tr>
<td><strong>Route length (km)</strong></td>
<td>20.7</td>
<td>20.7</td>
<td>22.8</td>
<td>50.9</td>
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<tr>
<td><strong>no. stops</strong></td>
<td>56</td>
<td>50</td>
<td>38</td>
<td>18</td>
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<tr>
<td><strong>peak demand (pph)</strong></td>
<td>5551</td>
<td>2185</td>
<td>2655</td>
<td>3273</td>
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<td><strong>off-peak demand (pph)</strong></td>
<td>3776</td>
<td>905</td>
<td>660</td>
<td>931</td>
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<td><strong>annual demand (Moppy)</strong></td>
<td>24.7</td>
<td>7.2</td>
<td>7.8</td>
<td>8.9</td>
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<td><strong>growth in demand (%pa)</strong></td>
<td>0.11</td>
<td>0.31</td>
<td>0.7</td>
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<tr>
<td><strong>no. vehicles</strong></td>
<td>406</td>
<td>36</td>
<td>43</td>
<td>39</td>
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<tr>
<td><strong>avg vech speed (kph)</strong></td>
<td>30.7</td>
<td>14.4</td>
<td>14.4</td>
<td>30</td>
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<tr>
<td><strong>avg trip time in pk (mins)</strong></td>
<td>5.8</td>
<td>5.9</td>
<td>6.9</td>
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<td><strong>avg walking time in pk (mins)</strong></td>
<td>1.4</td>
<td>3.1</td>
<td>3.1</td>
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<td><strong>avg vech spacing (m)</strong></td>
<td>51</td>
<td>574</td>
<td>530</td>
<td>530</td>
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<tr>
<td><strong>fare (£)</strong></td>
<td>2.21</td>
<td>2.21</td>
<td>2.2</td>
<td>3.15</td>
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<td><strong>capital costs (£M)</strong></td>
<td>129</td>
<td>29.3</td>
<td>34.8</td>
<td>463</td>
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<td><strong>base year op costs (£M)</strong></td>
<td>5.9</td>
<td>2.9</td>
<td>3.3</td>
<td>9.9</td>
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<td><strong>PvV cost (£M)</strong></td>
<td>263</td>
<td>86</td>
<td>102</td>
<td>662</td>
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<td><strong>base year benefit (£M)</strong></td>
<td>54.6</td>
<td>15.8</td>
<td>16.8</td>
<td>37.9</td>
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<td><strong>PvV benefit (£M)</strong></td>
<td>1062</td>
<td>316</td>
<td>354</td>
<td>549</td>
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<tr>
<td><strong>Business BCR</strong></td>
<td>3.04</td>
<td>2.58</td>
<td>2.48</td>
<td>0.16</td>
</tr>
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</table>

**Fare for breakeven (£)** (7)

| 3.75 | 1.6 | 0.79 | 0.05 | 7.9 | 14.5 | 1.27 |

**BRC Sensitivity analysis:**
-20% demand, +20% cost

| 2 | -1.87 | 1.8 | -0.4 | -0.86 | -0.74 | -0.75 | -0.97 | 1.24 | -0.88 | 0.28 | -0.11 | 0.25 | 0.08 | -0.52 |

**BCR special cases**
- Special for Vienna (£)

| -0.96 |

- Special for Madrid (£)

| 0.38 |

- track costs as HTB

| 2.04 | 0.32 | 0.32 | -0.87 | -0.88 | -0.92 | 1.06 | -0.98 | -0.04 | 0.01 | -0.38 |

**Notes:**
1. People lost for 5 hrs in Madrid, 4 hrs in other cities, all have operating periods of 16 hrs/day
2. Vehicle numbers probably too low for scheme to be viable
3. Vehicle spacing of 21.4m at 30.4kph = 2.5 sec headway - not viable
4. Peak hour demand < off-peak?
5. 35% of required HTB guideway already exists, capital costs are reduced accordingly
6. Initial need for 473 buses only, remainder purchased under old bus renewal programme in yrs 5 and 10
7. Approx. fare required for BCR = 0 = PvV Benefit = PvV Costs
CAS 5 – Car share clubs
Next steps

- Get answers from Ref Grp and from Demo sites before end of project
- Feedback from testing will help:
  - Identify and correct outstanding bugs
  - Refine the tool & guidelines to improve:
    - Usability
    - Value
The NICHES+ Guidelines for Implementers
CAS 6 – the Tram
Thank you

Contact

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For NICHES+ Guidelines: www.niches-transport.org