The Common Appraisal Framework

Developments and Updates

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The Common Appraisal Framework

• Published by DTTaS in March 2016.

• Provides guidelines for the appraisal of Transport projects and programmes.

• Informed by, and works in tandem with, the Public Spending Code.

• Includes transport-specific templates & parameter values
Common Appraisal Framework - Outline

Section 1
• Overview of project development process

Section 2
• Preliminary Appraisal

Section 3
• Overview of the Detailed Appraisal

Section 4
• Detailed Guidance on Appraisal Techniques

Section 5
• Detailed Guidance on Appraisal Parameters

Section 6
• Evaluation
• Monitoring
• Implementation

Section 7
• Templates

ANNEX 1: Parameter Values
Transport Parameters in the CAF

- **Value of Time**
  - Work, Commuting & Leisure

- **Vehicle Operating Costs**
  - Fuel & Non-Fuel Costs

- **Emission Values**
  - CO₂, NOₓ & PM (PLUS guidance on Noise pollution)

- **Collision Costs**
  - Fatal, Serious, Slight & Damage Only

- **Active Travel Values**
  - Health & Absenteeism Benefits
Value of Time Parameter Values

- Transportation projects frequently involve Time Savings as a benefit.
- Value of Time varies according to purpose (i.e. business, leisure or commuting).
- Calculating these values based on a “Cost Saving Approach”.
- Business travel VoT based on:
  
  “the average hourly labour costs, estimated by dividing aggregate labour costs by annual hours worked” (from CSO data).

- Leisure time valuation is at 40% of hourly earnings of travellers
- Commuting time is valued at 10% above Leisure time valuations
## Value of Time Parameter Values

### Table A.6: In-Work Value of Travel Time in Factor Costs and Market Prices, 2011

<table>
<thead>
<tr>
<th>In-Work Value of Time €/hour</th>
<th>In-work Value of Time €/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor cost</td>
<td>Market Prices</td>
</tr>
<tr>
<td>€29.02</td>
<td>€34.33</td>
</tr>
</tbody>
</table>

### Table A.7: Leisure Travel Time Values in Factor Costs and Market Prices, 2011

<table>
<thead>
<tr>
<th>Leisure Value of Time €/hour</th>
<th>Leisure Value of Time €/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor Costs</td>
<td>Market Prices</td>
</tr>
<tr>
<td>€10.78</td>
<td>€12.75</td>
</tr>
</tbody>
</table>

Average hourly earnings for travellers are calculated at €26.95 for 2011.

### Table A.8: Commuting Travel Time Values in Factor Costs and Market Prices, 2011

<table>
<thead>
<tr>
<th>Commuting Value of Time €/hour</th>
<th>Commuting Value of Time €/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor Costs</td>
<td>Market Prices</td>
</tr>
<tr>
<td>€11.86</td>
<td>€14.03</td>
</tr>
</tbody>
</table>
Transport Users’ Benefits Calculation

• Where as a result of an investment the cost of the good to the consumer falls, then the Consumers’ Surplus will rise.

• For existing users, the benefit to them is measured by the rectangle $C^0DFC^1$ (or by $(C^0 - C^1)T^0$).

• For new users, the Consumers’ Surplus is the shaded triangle DEF or by $0.5*(C^0 - C^1)(T^0 - T^1)$. 
CAF Update - What’s next?

• CAF update to take place in conjunction with Public Spending Code update.

• Parameter values to be updated from 2011 prices to 2016 prices.

• Will utilise data from EPA, RSA and CSO for revised transport parameter values.

• Two new parameter values to be included in the CAF:
  1. Journey Reliability
  2. Journey Quality

• Allows appraisals to better capture and quantify changes that impact transport users.

• The new parameter values will have a significant impact on future transport project appraisal.
New Parameter Values – Journey Reliability

• Journey Reliability = “reliability stemming from unplanned variations in journey times of a routine day-to-day nature”.

• It is calculated as the difference between the actual time of a journey and the expected time of the journey.

• In order to capture the benefits obtained from improved journey time reliability, parameter values have been developed to enhance the appraisal process.

• Reliability values are commonly expressed in equivalent units of journey time. These ‘time multipliers’ can then be applied to Values of Time to determine the monetary value of improved reliability.
The representation of reliability for car is in terms of the reliability ratio (RR). The RR denotes the ratio of the value of the standard deviation of travel time relative to the value of mean travel time.

\[
\text{Existing Car Users' Change in Consumer Surplus} = (T_{old}) \times \left(\text{VoT}(\text{STD}_{old} - \text{STD}_{new})\right) \times (RR)
\]

\[
\text{New Car Users' Change in Consumer Surplus} = 0.5 \times (T_{old} + T_{new}) \times (\text{VoT}(\text{STD}_{old} - \text{STD}_{new}) \times (RR)
\]
Journey Reliability – Public Transport

<table>
<thead>
<tr>
<th>Mode</th>
<th>Commute</th>
<th>Employers’ Business</th>
<th>Other Non Work</th>
<th>Sensitivity Analysis Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus/Luas/Metro</td>
<td>2.9</td>
<td>2.8</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Rail</td>
<td>2.9</td>
<td>2.8</td>
<td>3.2</td>
<td>2.0</td>
</tr>
</tbody>
</table>

- The representation of reliability for public transport is in terms of a Lateness Multiplier.

- The LM denotes, in time units, the value of ‘mean lateness’ at the destination relative to the public transport schedule.

- Mean lateness = the mean of the travel time between scheduled arrival and actual arrival.

\[
\text{Existing PT Users’ Consumer Surplus} = (T^{old}) \cdot \left( \text{VoT}(\text{Mean Lateness}^{old} - \text{Mean Lateness}^{new}) \right) \cdot (LM)
\]

\[
\text{New PT Users’ Change in Consumer Surplus} = 0.5 \cdot (T^{old} - T^{new}) \cdot \left( \text{VoT}(\text{Mean Lateness}^{old} - \text{Mean Lateness}^{new}) \right) \cdot (LM)
\]
Journey Reliability Example – Public Transport

• Assume a specific bus route along a corridor. Under current conditions there are 1,000 passengers on this route an average working day.

• An improvement to the service increases the reliability of travel time on the bus route and increases the number of people travelling on the route per day to 1,300.

<table>
<thead>
<tr>
<th>Travel Time (minutes)</th>
<th>Before Improvement to Service</th>
<th>After Improvement to Service</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Lateness of the service per journey</td>
<td>8</td>
<td>5</td>
<td>(3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passengers on the Bus Route</th>
<th>Before Improvement to Service</th>
<th>After Improvement to Service</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuters</td>
<td>500</td>
<td>600</td>
<td>100</td>
</tr>
<tr>
<td>Business Travellers</td>
<td>200</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td>Other</td>
<td>300</td>
<td>400</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>1,000</td>
<td>1,300</td>
<td>300</td>
</tr>
</tbody>
</table>
Journey Reliability Example – Public Transport

• The reliability benefits per day are calculated as follows:

• Existing Users:

  Commuters  \( 500 \times 3 \times 2.9 \times \left( \frac{VOT}{60} \right) = \)

  Business  \( 200 \times 3 \times 2.8 \times \left( \frac{VOT}{60} \right) = \)

  Other  \( 300 \times 3 \times 2.5 \times \left( \frac{VOT}{60} \right) = \)

• New Users:

  Commuters  \( 100 \times 3 \times 2.9 \times 0.5 \times \left( \frac{VOT}{60} \right) = \)

  Business  \( 100 \times 3 \times 2.8 \times 0.5 \times \left( \frac{VOT}{60} \right) = \)

  Other  \( 100 \times 3 \times 2.5 \times 0.5 \times \left( \frac{VOT}{60} \right) = \)

Rule of a half!
New Parameter Values – Journey Quality

• Parameter value to quantify user impacts from changes in crowding on Public Transport.

• Two measures of crowding:
  — Load factor (LF) – i.e. the ratio of total passengers to the number of seats; and
  — Standing passengers per metre squared (SP/m²)

• Most appropriate measure of the inconvenience of standing is SP/m²

• For seated passengers, LF remains a suitable indicator up until the PT’s seating capacity is completely occupied.

• Once occupancy goes above full seated capacity (i.e. 100% LF), SP/m² is a more sensible indicator of subsequent crowding.
## Journey Quality - Rail

<table>
<thead>
<tr>
<th>RAIL</th>
<th>Commute</th>
<th>Business</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>- Seated Passengers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seated 50% load</td>
<td>0.73</td>
<td>0.75</td>
<td>0.72</td>
</tr>
<tr>
<td>Seated 75% load</td>
<td>0.79</td>
<td>0.76</td>
<td>0.72</td>
</tr>
<tr>
<td>Seated 100% load</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Seated - 1 passenger standing per $m^2$</td>
<td>1.09</td>
<td>1.13</td>
<td>1.14</td>
</tr>
<tr>
<td>Seated - 3 or more passengers standing per $m^2$</td>
<td>1.31</td>
<td>1.36</td>
<td>1.39</td>
</tr>
<tr>
<td><strong>- Standing Passengers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing - 0.5 passengers standing per $m^2$</td>
<td>1.16</td>
<td>1.29</td>
<td>1.21</td>
</tr>
<tr>
<td>Standing - 1 passenger standing per $m^2$</td>
<td>1.19</td>
<td>1.38</td>
<td>1.27</td>
</tr>
<tr>
<td>Standing - 2 passengers standing per $m^2$</td>
<td>1.32</td>
<td>1.56</td>
<td>1.57</td>
</tr>
<tr>
<td>Standing - 3 passengers standing per $m^2$</td>
<td>1.57</td>
<td>1.61</td>
<td>1.79</td>
</tr>
<tr>
<td>Standing - 4 passengers standing per $m^2$</td>
<td>1.86</td>
<td>2.03</td>
<td>2.17</td>
</tr>
</tbody>
</table>
Journey Quality – Applying the Values

• Previous table = parameter values (VoT multipliers) for different crowding levels for rail travel.

• Values also exist for Bus and Other (i.e. light rail).

• From these values, specific crowding factors can be calculated.

• Crowding factors are required to calculate benefits from changes in crowding conditions.

• The crowding factors are obtained by applying the values in the table to the specific characteristics of the public transport service (i.e. capacity, ratio of seats to standing capacity, etc.)
What’s Missing from the CAF?

Wider Economic Benefits

• Appraisals do not fully capture or quantify wider economic benefits of transport projects and programmes.
• Methodologies do exist outside Ireland
• Potentially biases against certain projects that provide these benefits.

Socio-Economic Impacts

• Similar to above.
• Does not quantify impact on vulnerable groups.
• Potential impact on project selection.
Thank You!