Outline

• Background to ULTra
• Short Video
• Heathrow Application
• Passenger Response
• Conclusions
ULTra: Urban Light Transport:

Started January 1995 at University of Bristol

To define an urban transport system for the next century, meeting future needs for flexible personal transport, while being highly acceptable in an urban environment.
<table>
<thead>
<tr>
<th></th>
<th>Personal</th>
<th>Collective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Area</td>
<td>85% Car</td>
<td>15% Bus</td>
</tr>
<tr>
<td></td>
<td>Taxi</td>
<td>Tram</td>
</tr>
<tr>
<td></td>
<td>Walk/Cycle</td>
<td>Train</td>
</tr>
<tr>
<td>Corridor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Passenger km: Collective re personal modes

Source: Personal Travel by Mode 2008
% Trips taken by Bus

[Bar chart showing percentage of trips taken by bus for different age groups: <17, 17-20, 21-29, 30-39, 40-49, 50-59, 60-69, 70+, All ages]
Bristol Trip Demand

Car: am peak hour
- >100
- 50 to 100
- 25 to 50
• Small automatic vehicles running on their own guideway network
• Off line stations providing non-stop journeys
• No waiting
• Capacity equal or better than light rail/bus, but much lower capital / operating costs
• Major environmental benefits
Advantages of ULTra

Capacity
An ULTra system has the potential to carry as many people as a:

- Lane of road traffic
- 200 seat light rail vehicle arriving every 5 minutes,
- 50 seat bus every 75 seconds.

Complementary to existing modes
- New solution for "last mile" problems

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Low capital costs

<table>
<thead>
<tr>
<th>Mode</th>
<th>£m/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic People Movers (“APM”)</td>
<td>12 – 40</td>
</tr>
<tr>
<td>Light Rail</td>
<td>9 – 14</td>
</tr>
<tr>
<td>ULTra</td>
<td>4-6</td>
</tr>
</tbody>
</table>
Vehicle
• 450kg payload
• 4 -6 passengers
• 25 mph
• 2 kW continuous power
• Battery power - 6% gross weight

Infrastructure
• Standard form available
• Low visual intrusion (450mm)
• Lighter than equivalent footbridge
• Rapid installation
• Great flexibility
Sustainability

- Zero emissions at point of use
- Low external noise
- Low visual intrusion
- Low resource requirements
- Low embodied energy

Energy use by transport

UK Data. Assumptions:
- Average passenger loads
- Well to wheel (darker shading direct electricity use only)
Europe’s busiest airport:
Consequences:

- Passenger Service Issues
- Pollution problems
- Congestion
- Space restrictions
- Capacity restrictions
- Very inadequate connectivity

PRT considered to be only practicable solution
Much Improved Passenger Service
- Predictable
- No waiting and personal service
- 60% saving in travel time

Environmental Benefits
- Zero emissions and low noise
- 365 tonnes Carbon saving pa (full rollout)

Financial Benefits:
- 40% saving over shuttle buses
- Less than half capital cost of competing systems
- Possible premium charging

More efficient use of space
- Both for staff and passengers
## Bus vs ULTra Comparison

Data from Heathrow Study, 4 car parks

<table>
<thead>
<tr>
<th></th>
<th>Walk time mins</th>
<th>Wait time mins</th>
<th>In-vehicle time mins</th>
<th>Total mins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shuttle Buses</td>
<td>2.9</td>
<td>3.1</td>
<td>9.8</td>
<td>15.8</td>
</tr>
<tr>
<td>ULTra</td>
<td>0.6</td>
<td>0.2</td>
<td>5.4</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Average Time Saving by PRT 9.6 mins
Other benefits

- Land values and availability
- Increased office rents
- Increased staff productivity
- Reduced traffic congestion
- Sponsors – of vehicle and stations
- Advertising
- Third party partnerships (stations)
- Improved Road safety
First Phase at Heathrow

- Business Parking to T5
- 3.9 km of single guideway
- 21 vehicles
- 3 stations
- 5min journey time

Traverses 2 rivers and 7 roads
Green belt land
Negotiates Aircraft surfaces
Bridges in-ground services
Conforms to T5 architecture
Looks “Intended”
Operating Experience

- 250,000 trips to date
- Up to 1000 trips per day
- Operating 22 hrs per day
- Experience
  - Vehicle: Excellent; exceeding expectations
  - Central Control Systems: very satisfactory
  - Automatic Vehicle Protection System: Excellent; exceeding expectations
Simulated Revenue Service

4 weeks of continuous operation, 10.5 hours per day

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journey Reliability</td>
<td>1: 750</td>
<td>1 : 1200</td>
</tr>
<tr>
<td>System Availability</td>
<td>99.0%</td>
<td>99.6%</td>
</tr>
<tr>
<td>Safety sign-off</td>
<td>Required</td>
<td>Achieved</td>
</tr>
<tr>
<td>Passenger Survey</td>
<td>As good as bus</td>
<td>88% said PRT system better than bus</td>
</tr>
</tbody>
</table>
% Rating Excellent

- Waiting time at stations
- Modern Image
- Environmentally Friendly
- Overall experience
- Ease of Boarding
- Personal Safety
- Information on Use
- Confidence
- Personal space
- Personal Comfort
- Ease of Storage
- Station at T5
- Station at car park

ULTra
Bus

CityMobil
Possible Bristol City Centre Scheme

16 km track
15 million passengers /year
£80 million

Proposed Bristol LRT Scheme
16 km
5 million passengers /year
£210 million
Conclusions

- Heathrow is providing a very positive demonstration of the benefits of PRT
- PRT offers major gains in passenger service and sustainability
- Passengers strongly prefer PRT service to bus
- PRT offers a new and cost effective approach to sustainable transport
Thank You

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